GAS JOURNAL

LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

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EDITORIAL NOTES.

Coke-Oven Gas Supply—Local and National.

In considering the question of coke-oven gas supply for town purposes, there must always be care that the conditions permit the supreme control to remain in the hands of the gas undertakings. They are working under statutory obligations; the coke-oven owners are not. Every provision must therefore be made to ensure, as far as possible, continuity of supply. When some of the conditions in the later contracts are divulged, we should not be surprised to find there has been an eye to providing for emergencies in manner similar to what is done at gas-works. There is no reason, for example, why at the coke-ovens large stand-by stocks of coal should not be in existence, if the plants are going to take any substantial part in the making of gas for the supply of urban areas within reasonable distance. Again, there is no reason why the labour employed at coke-ovens in manufacturing gas for town supply should not be brought into its appropriate trade union, which is the one in which other unionist gas workers are enrolled. Situation makes no difference whatever to the fact that the men are engaged in the carbonization of coal for producing gas, coke, and other products. Those operations have nothing to do with the mining of coal; they are only concerned with its utilization subsequent to mining. There would be just as much sense in the workers of the gas industry being members of the Miners' Associations as there is in the workers employed on coking plants being members of them. If such changes come about, and so give greater assurance regarding continuity of supply, there will, without doubt, be a large increase in the utilization of coke-oven gas in surrounding territories—always providing the price is right. No one can prevent this. It would be economically unsound to stop it, although it must always be remembered that the transfer of the seat of gas production from gas-works to coking plants means a removal of other present conditions, such as the deprivation of gas undertakings—to the extent of gas patronage—of supplies and trading in secondary products.

However, coke-oven gas supply for town purposes in this country is never likely to develop in the way that the Ruhr coal and steel and the brown coal interests are hoping will be the case in Germany. A brief article in another column, summarizing a published memorandum on the subject, supplies the latest information regarding Germany. We think that it is right to keep the British gas industry as fully apprised as circumstances will allow of particulars as to the projects for the fundamental alterations of the gas-supply conditions in Germany. It is obvious that the promoters of the gigantic scheme are getting a little nervous regarding the attitude towards it of the gas undertakings. They now distinctly assert that the scheme can only be carried through if there is unanimous support by all coalfields and all gas-works throughout the country. It is patent that unanimous support is not likely to be secured; and we do not see that the coal and steel interests have very much encouragement to harbour hope. While they make out a plausible case for the adoption of their scheme, it is positively certain that they are not doing this without having sized-up the material advantage to themselves. Apart from the important question of the price at which they will be able to supply in bulk (which is as yet a very vague element in the situation), the coal and steel interests make certain other points which, to our mind, show a wonderful capacity for specious argument. Take, for instance, the difficult, which is experienced by coal buyers in obtaining the brands of coal they desire, the promoters of the scheme argue that this trouble would be removed if the coal producers were also bulk gas suppliers. The complaint respecting the difficulty of gas undertakings procuring what is wanted in respect of coal since the Coal-Selling Syndicate has been in existence in Germany has been referred to several times in our columns. But is it not a fact that in that Coal-Selling Syndicate the coal producers exercise a very potent influence? We imagine that, if they chose, they could exercise that influence to give relief to gas undertakings in the matter of obtaining suitable brands of coal. Apparently they are not particularly desirous of doing that; and, if that is really so, it is not an unfair deduction to say that they would rather use the position as a lever in, and a reason for, carrying out their plan of bulk gas supply from the colliery and coking centres. They submit that another anxiety from which the gas industry would be relieved if their project goes through is that of coke disposal. Apparently the promoters of the scheme have themselves no uneasiness in taking over the burden of coke disposal, although removed from the local markets. It is obvious that, once they can get into the position of being the sole fuel suppliers in the country, they will also be in the position to ensure that they will not be the sufferers. Further, it is pointed out by them, there will be no more capital expenditure required on gas-works plant. That is a consideration to which the promoters themselves do not seem to object, so long as they can get into their hands the provision of the supply of gas for the whole country. Incidentally, it is observed that they now deny that there is any intention to seek the co-operation of the State in this venture.

A further piece of information is that, by way of a start, four main distribution arteries from the coking-plant areas are proposed; but the promoters are rather shy of giving away any definite information as to the computations they have made regarding costs. It is, however, mentioned that for 500 mm. (19·69-in. main), the cost is estimated at about £6050 per mile. There is relatively little difference between this figure and the one given by Mr. Harald Nielsen in his article on "Long Distance Gas Transmission" in the "JOURNAL" for Feb. 10, 1926 (p. 341). His cost for a 20-in. pipeline worked out to £5700, with steel based on a price of £21 per ton finished. Assuming an annual sale averaging 2½ million c.ft. per hour at a distance of 400 kilometres (approximately 250 miles), the amount of the transport cost would be roundly 3·4d. per 1000 c.ft. This figure for transmission also works out practically to the same as that of Mr. Nielsen, as published in the article referred to, although he assumed a travel of 75 miles only. But while he was scrupulously careful to give the factors on which he based his computations, the factors taken in the German calculations have not yet been published—at any rate, they have not come under our notice.

Service to the Consumers.

VERY properly we hear in these times a great deal about the educational training of employees of gas undertakings. The paper which Mr. J. H. Canning, of Newport (Mon.), read at the annual meeting of the Institution of Gas Engineers on "Some Experiences of Gas Service" impresses us deeply regarding the educational value to administrators of gas undertakings and their chief officials of engaging—if initially only in some small way—in the investigation of the gas conditions existing on consumers' premises. It is there that they will get their most telling lesson as to the imperative need of not severing at the meter outlet their interest in the supply of gas. If introductory effort merely takes the form of inspection and advice at the start, what is found will, we are confident, lead to development of service until consumers' equipments will have as much careful concern devoted to them as the plant which produces the gas which, it is to the mutual interest of consumers and undertakings, should be used in the best possible manner. Mr. Canning in his valuable contribution lays stress on the importance of recognizing this reciprocal interest, especially in the new environment in which the gas industry finds itself. The fact appears to be still overlooked by some undertakings that, with the choice of agents now open to householders and others, they have not the same reliance upon one as they had in times past, and that defect in their existing arrangements is one of the best propelling forces from the old to the new.

Underlying all that Mr. Canning says in his paper is the evidence of how a wise interest in this matter of service over a long number of years has gradually enlarged thoughts and views until the system has developed which at present operates admirably in Newport, which statement invites the reiteration of the remark that a plan of service which is complete and sufficient for one area may not in all details be the best for another undertaking's district. In the first place, Mr. Canning directs attention to the need, in order to promote the development of gas used in individual premises, for service-pipes being of adequate dimensions, and his practice is now a minimum of 1 in. The lesson as to the value of individual contact with the consumers was learned in Newport thirty years ago, when the Company instituted incandescent burner maintenance, and more recently appointed a specal canvasser who (with a hawker's licence) carries with him samples of efficient burners which are supplied at a moderate price, and fixed free on the premises of consumers who desire to improve their lighting. The value of getting new burners established in place of old inefficient ones is obvious. With the samples the canvasser has with him, he can demonstrate to consumers on their own fittings that trashy and worn-out burners are the cause of complaints, and not, as is commonly supposed, "bad gas." The influence of the burner canvasser does not end with the lighting load; for, as is shown in the paper, he has brought in orders for all sorts of new gas appliances. A sample year's sales through him is given in tabular form on p. 922 of our Institution Number. Passing on, it is seen that while the Company maintain free all hired apparatus, a system of inspection of privately owned appliances was commenced after the war; and for the cleaning and repairing of these (when found to require attention) estimates are supplied to the consumers. A more recent development, in order to ensure proper installation, is that the Company have instituted a policy of fixing free all cookers, fires, radiators, boilers, &c., purchased for cash or on the hire-purchase system.

The inspection of consumers' appliances revealed in Newport, as it has in other towns, unsuspected conditions. It was educational. It impressed the importance among other things of doing all possible to eliminate the use of the old type of brass tubing, with brazed or soldered butt joints. There was substantial revelation regarding the necessity of every undertaking testing even all new fittings to ensure that they are free from leakage. It further disclosed how some modern taps are not so guiltless as the old form in respect of gas tightness, through quick wearing away of plugs and seatings. This difference between the old and the new types of taps is traceable by Mr. Canning to the composition and physical structure of the alloy used in their making, and to the modern tapers which have been adopted. He advises that there should be a reversion to a taper between 1 in 12 and 1 in 16; and though he is not favourable to extremes in standardization, he does think standardization might be applied to the material used and to the actual working parts. We are glad to see the favour in which he holds co-operation between the manufacturers of gas appliances and gas undertakings, who are in intimate touch with the users of those appliances, in all matters which will inure to the general advantage of the industry.

Good cause is shown by Mr. Canning for the technical training of gasfitters—a point upon which too much emphasis cannot be laid. Although it has been made a controversial matter through differing opinions, we are, from extensive impartial observation and investigation, confident that technical training is very essential. As far back as 1912, arrangements were made with the Education Committee of the Newport Corporation for courses at the Newport Technical Institute in elementary mathematics, elementary science, and gasfitting—the Company giving the pupils the time necessary for attending the mathematics and science classes in the afternoon, while the gasfitting classes are attended in their own time in the evening. All fees, too, are paid by the Company. All grades of the Company's employees engaged in the outdoor activities of the concern are encouraged to attend the courses, because the Company believe (and it is a belief worth accepting by all other undertakings) in all employees who have relations with the public being in possession of technical knowledge which may be intelligently used. From this there has been another development. It is found that the general educational qualifications of apprentices is an important factor in enabling them to profit in good measure from the technical instruction. The result is that at Newport apprentices are now selected from pupils who have attended the Municipal Secondary School or other institutions of similar standing. The experience is that progress is far more rapid with such students, and the number of failures is correspondingly reduced; while manifestly it is a great advantage to an undertaking to have the best type of man possible to work in the houses of its customers.

The paper deals with many other matters; but the summing-up by Mr. Canning at the end should be most valuable to those managements who are considering the development of service among the public, as many who have hitherto been backward will do shortly. There will still be some who will procrastinate until they find serious damage has been done to their businesses, and then they will scud into what is deemed politic with less dignity and effect than would have been the case in the past, or even at the present time. The contribution is full of ripe experience obtained in the circumstances of Newport, with keen competition existing in service on the part of the Corporation Electricity Department, though competition should not be the only incentive to good service among the consumers. There is the moral obligation of those entrusted with a public utility to see that consumers do obtain from it the best results possible to mutual advantage. The fact is outstanding that, in the ways to which we have briefly referred, supplemented by showrooms, publicity, and other educational work among the consumers, public service pays—particularly when based on a sound foundation, with prudent flexibility, and the service made as much a personal matter as possible. Some may still take refuge against this behind the dictum of our late revered friend, Thomas Newbigging, that "dividends are made in the retort-house." They were once upon a time, when gas occupied an unchallenged place in public service. But that is not the case to-day. Service on the district and the efficient operation of the manufacturing plant are complementary in the maintenance of the stability and progress of a gas undertaking. As soon as a man quits aphorism for argument against the truth of this assertion, he finds himself floundering about in such rough reasoning that he soon has to recede from an attitude which ill-fits the conditions of these times. Cheap gas, the new President of the In-

stitution (Mr. H. D. Madden), Mr. Goodenough, Mr. Canning, and many others hold as highly essential; but they also submit that cheap gas which is misused may not be so economical as dearer gas consumed efficiently in appliances well maintained and safe. How is this efficiency to be assured other than by entering the premises of consumers?

Every time this matter of public service is brought to the front and discussed, there come the signs of fresh awakening to its importance. We are confident that the day will come when the gas undertakings who do not carry their service to the point of combustion will be of the few, and not of the many.

Training of the Young for Industry and Commerce.

IN the work of the Association for Education in Industry and Commerce, the gas industry is taking a very live part; and proceedings at the Ninth Annual Conference last week carried conviction that such conferences, and the pooling of experiences, are very necessary in order to realize the objective which all far-seeing men in the work of our country have before them in relation to our future workers. It was seen during the proceedings that, while all are persuaded that something must be done, there is a wide diversity of opinion as to the lines which should be pursued. There are some who state that education aiming at character and alertness rather than technical knowledge is the right thing; there are others who say that if a boy is not well grounded, it is impossible to teach him the technical side; and there are other views. The proceedings point to the need for those concerned to concentrate on what is actually required, because in the differences of opinion are the elements of what is really necessary; and their selection and combination will give us what is required.

This year the President of the Association is Sir David Milne-Watson; and the address which he delivered on the occasion suggests many pertinent matters for consideration, and, in our judgment, correctly delineates (without entering into detail) those lines which should be followed in order to solve the problem of the education of boys and girls for industry and commerce on a generally applicable foundation. The gas industry and those associated with it, as the President mentioned, are able to take a very broad outlook in this regard, in view of the facts that the industry is a large employer of labour, and that its activities extend, through the very nature of its requirements and products, into many other of the important industries of the country. Its views have been receiving, and will continue to receive, considerable expression and discussion through the President's membership of Mr. Malcolm's Committee on Education in Industry. That by the way. The question which is before all who are responsibly engaged in industry and commerce is, as Sir David puts it, what kind of education do we want, and how are we to ensure that the boys and girls who come into our works and offices actually get that kind of education? It is clear that purely elementary education does not alone suffice; otherwise the matter would not be regarded as a subject for such extended consideration and discussion as is now being given to it. Something more is wanted. Sir David is anxious that the interest of industry in this matter should not be along narrow lines, but along the broader lines of training for general intelligence and adaptability. With the fullest meaning attached to the terms "general intelligence and adaptability," we have the primary requirement put into a nutshell; but before we can get all who are, or should be, concerned to grasp the truth of the words, there is work to be done in clearing away the fog which possesses the minds of those who alone can exercise the necessary influence. Membership of the Association attests that the lesson has been learned that the utmost efficiency from workers has not hitherto been obtained, and that there is something latent which requires development. Outside we hear of aversion to the education of the worker on the ground that it makes them more ambitious. Such aversion comes from obscurants who, for reasons which need not be specifically described, have failed to grasp the fundamental truth that efficiency in workers is as great a need as efficiency in machinery and material; and efficiency in men is largely—not entirely—a matter of knowledge.

Thus the greatest initial difficulty is to get all men with controlling influence in industry and commerce on to a common platform in respect of appreciation; and when we succeed in this, there must be a clear understanding that, in our schools, the first thing to be done for preparing boys and girls for their work in life will be to give them, upon the elementary education, the fundamental education which will be of assistance to them when they enter the industry or trade which they may select, and before any form of specialization takes place. The specialization itself can for such workers come from within the industry or trade itself. For example, take the gas industry. The boy who is desirous of taking part in a section of its work should be in a position to obtain education which (while other, to him, useless subjects are discarded) incorporates such things as elementary mathematics, chemistry, physics, and perhaps drawing. Such subjects, whether he enters the gas industry or not, would go far to improve his efficiency in any other line of industry or trade, and at the same time would comply with Sir David's idea of a course of training which would develop "a general intelligence and adaptability." It is easy to see that any youngster who has been so educated (though the subjects mentioned are confined to the elementary stage) will possess the grounding for specializing in one or other branches of gas supply or of any other industry. We have very little patience with those who talk disparagingly of these matters, as though it were our duty in life to repress, and not develop, the efficiency of men. Education such as is indicated enables the boy to bring to bear a greater knowledge and ability in the days of his training in practical work, and influences that work throughout his career.

In his address, Sir David also claims that industry has a special right to help to direct education along those lines which will best serve its needs. Those whose duty it is nationally to provide the means of giving education cannot, if broad-minded, fail to recognize that industry itself is the best source from which to obtain guidance in this matter. The responsibility for giving that guidance rests upon industry; and the responsibility is upon those in educational power to seek that advice, and to profit by it. In that particular direction, there have been considerable developments of recent years. We have seen them in connection with the Board of Education, whose interest, for instance, in the Education Scheme of the Institution of Gas Engineers has been of an invaluable order. We have witnessed it also in connection with universities whose work particularly lies in the direction of the application of science to industry. But it has to be recognized that there is still, in the educational world, a large representation of the old order of things, which objects to any interference with what they regard as their prerogative in formulating the lines of work for the education of the young. That self-sufficiency (where it exists) has to be broken down; and it will be if industry and commerce together bring their weight to bear intelligently and diplomatically upon it. The zenith in such educational work as is under consideration is that which produces the greatest practical result, not only for the individual, but for the common weal; and this has to be recognized by all our educationists.

There is another point in the address to which special attention may be directed. It is the remark by Sir David that "no educational schemes can be successful from a firm's point of view unless parents, masters, and boys are persuaded that a firm chooses its young recruits carefully, and that the best boys and girls are to be in the best places, are encouraged to go on improving themselves, and, so far as possible, are rewarded by promotion for the efforts they have made." With that we are in thorough agreement. The appointment of workers in past times, we are afraid, has been somewhat slipshod. There has been too much nepotism, too much favour, too much of the lineal type of appointment, which has allowed the sons of workers without question to follow their fathers. There is no objection to this provided sons can show better qualifications than other candidates; but if they cannot, then there is no reason why any firm, in its

own interests, should continue the chain of employment for one family. The son may be better qualified for employment of some other type; the work that his father has been doing may be of a character which would better suit the son of another man. The boast that a family of workers has been connected with a particular business for generations is to us merely an excellent testimony to the employers; it is not necessarily the best assurance that the business has profited from the lineal association.

Sir David also takes us into practical considerations affecting this matter of education. He is human; and he is not altogether certain that such things as evening schools are the best of methods for realizing the aim of better qualifying boys for their future place in life. He is no believer in the "tired teaching of tired pupils." But he considers it far more valuable that day instruction should be sandwiched into a boy's industrial life, either as intensive courses of short duration, or as part time instruction where this better fits the conditions of the particular industry. He finds that, if the right teachers are chosen, apprenticeship can be made to provide just this kind of training over a definite period. We agree with him. The illustrations he gave from the methods of the Gas Light and Coke Company show that they practise fully what he preaches in this regard. It is clear from those practices—from the sandwiching of instruction at the technical school with instruction in the workshops—that the line of procedure which we have sought to emphasize in this article is the one that is approved by the Company, who are such experienced employers of labour on a large scale—that is to say, in the school fundamental principles should be taught which increase intelligence and ability, and engender greater responsibility in men, while the technical or specialized work upon which the boy is in after life to be engaged is taught by the industry itself in whose service he intends to take his future working part. The appropriate training of boys for industry is a question fit to engage the best intelligences, and one which will be beneficial not only to industry, but to the country at large. Properly ordered, it will create men who will strongly oppose those reactionary and destructive forces which are to-day striving hard for mastery in the industrial world.

Our Institution Number.

We thank the several friends who have complimented us upon the completeness of the Institution Number of the "JOURNAL." It certainly constitutes the fullest report of the proceedings that has been published.

An Eaton Romance.

In our "Miscellaneous News" to-day is a sketch of proceedings at a meeting of the creditors of the Wareham Electric Supply Company. The Senior Official Receiver (Mr. H. E. Burgess) had what he described as "a nasty story" to tell; and, as will be seen, it is an exposure of tactics and irregularities in this group of promotions which supplies a perfect justification of the criticisms which have so frequently been made in our columns. It will be observed that, towards the end of the review of the proceedings, the Official Receiver warned one of the Directors that he had got himself into a "terrible mess." This Director is only one of a number. There seems of late to have been a suspension of activities from 43, Cannon Street and other addresses.

A Mysterious Committee.

The City Editor of the "Daily Mail" last Tuesday informed his readers that shareholders in certain concerns in the chain of electrical and gas undertakings known as the "Eaton group" have been receiving through the post circulars inviting them to "join with others who are willing and able to obtain restitution." The circulars, which are in typescript, bear an address in Richmond, Surrey, and are signed (also in typescript) by "Reg. Reynolds, secretary." Enclosed with them are two forms—"A" and "B"—on which shareholders are invited to fill in elaborate details of their interests in the Eaton Companies. The last clause in form "B" reads: "I am willing to support a Committee of cash shareholders to remove the Directors, to inquire into the affairs of the Company, and to obtain reports as to the financial position, and obtain restitution of our moneys." There was no invitation to subscribe to the cost of the inquiries; neither was there any hint as to the identity of Mr. Reg. Reynolds's Committee, or by whom he or they have been appointed. Nor did a visit by a "Daily Mail" representative to the Richmond address succeed in clearing up these and other important points. Apparently Mr. Reynolds does not live at the address, which is a boarding-house; and the landlady, who allows him to have his letters addressed there, does not know where he actually resides.

Another Electrical Campaign.

A meeting was recently held at Bristol of a number of the supporters of the Wiring of British Homes Campaign, which took place during six months from last autumn to spring. The information was given by Mr. J. W. Beauchamp, the Director of the Electrical Development Association, that another campaign would be started shortly, and, by means of the work of the central body, retailers could get ideas, stimulus, and help. Much was said as to the value of the co-operation of all sections of the industry. We rather think there is a definite division of opinion as to the propriety of starting another campaign so soon after the last one. Some think it would be better to have a pause between that and another similar effort; others opine it would be in accord with the fitness of things to "keep the pot boiling;" others see where there were defects in the organization of the last campaign, and how in a new one the industry could profit from the harvest of experiences—good, bad, and indifferent. Upon the contribution of the wherewithal, the question of a second campaign depends. By the way, on the day of the meeting referred to above, the Lord Mayor of Bristol (Alderman E. M. Dyer) presented the prizes to the successful local competitors in the last campaign—among them the first prize of a cheque for £2000 to Miss Edna Gardiner, who has no present use for an "all-electric" house, and wisely preferred the cash.

Miners' Federation.

It is the intention of the Executive of the Miners' Federation to make the annual conference (which is to be held at Southport during the last week in July) an opportunity for showing signs of reanimation. On that occasion, resolutions are to be moved which will deal with twelve separate issues. Some of the districts (so far as represented by the Federation, who have lost a considerable portion of the old membership since making the deplorable hash of things last year) are asking for the repeal of the Eight-Hours Act. They will ask in vain. There are others who are requiring nationalization of mines and minerals. They will waste time. Indications as to the drift of the organization are given by recommendations in favour of the "Minority" programme, for an Anglo-Russian Miners' Committee, and for a referendum to the British miners on the question of affiliation or otherwise of the Communist party to the Labour party. The idea of a five-day working week is to be resuscitated. The salaries of mining Members of Parliament are to be reviewed. A superannuation scheme for aged miners is to be advanced, and the desire for an improved Workmen's Compensation Act will be another feature.

Coal Competition.

Regarding the eight-hour day, it is obvious that, had it not been for the extra time worked, with a view to reducing the standing charges per ton of coal raised, the conditions of the industry and of employment in it would have been much worse this year. Even now, we have not got to the point at which there can be competition on level lines with other coal-producing countries. It will be remembered that the Royal Commission on the Coal Industry based certain of their recommendations upon an increase in the export price of coal; and they averred that the colliery owners' estimate of 40 p.ct. above pre-war price was too pessimistic, and that a figure of 60 or 70 p.ct. might be anticipated. Events have proved that in this respect the colliery owners were right, and Sir Herbert Samuel and his colleagues were wrong. The present figure is barely 40 p.ct. It cannot be supposed that artificial raising

of the prices of export coal would compel our foreign customers to buy more of it.

Development of Foreign Coal.

In considering the conditions of the British coal industry, regard must be had to the developments which have taken place in the production of coal in other countries. Figures which Col. Lane-Fox, Secretary for Mines, circulated recently, supply the following comparative information as to output for 1908 and 1925:

	1908. Tons.	1925. Tons.
Germany (pre-war territory)—		
Coal	143,746,000	169,881,000
Lignite	63,709,000	137,543,000
France (pre-war territory)—		
Coal	36,044,000	41,097,000
Lignite	740,000	992,000
Spain	3,823,000	5,830,000
Italy—		
Coal	2,000	186,000
Lignite	472,000	1,090,000
Netherlands	894,000	7,003,000
South America—		
Brazil	14,000	(1924) 264,000
Chile (chiefly lignite)	925,000	1,420,000

Unionist Coal Committee.

There is one good thing that the coal stoppage last year accomplished—namely, it created greater public interest in affairs affecting the basic industry of the country. A number of Unionist Members of Parliament, who represent constituencies in which there are coal mines, have—in order that more effective action may be taken in future on questions relating to the improvement of the industry, and the welfare of the workers—formed a Committee on the lines of other party committees established for the consideration of special subjects. It will be called the Unionist Coal Committee. Mr. Roy Wilson is the Chairman; and Captain Guy Fanshaw, R.N., and Mr. Robert Hudson, Joint Hon. Secretaries.

PERSONAL.

Mr. R. J. BRADSHAW (who has left Devonport, where he was Engineer and Manager of the Plymouth Corporation Gas-Works, for a similar appointment at Hartlepool) has been presented by Mr. F. J. Westlake, on behalf of the staff, with a clock. Mr. Westlake expressed regret at losing so able a Manager, and wished Mr. Bradshaw success and happiness in his new sphere.

Mr. FREDERICK W. KENYON, who has for a number of years past been Commercial Sales Manager to Messrs. John Wright & Co., has been appointed by the Directors of that Company to a seat on the Board.

On the occasion of the annual inspection of the properties of the Accrington District Gas Board, which took place on June 29, an interesting presentation was made while the party were at the gas-works. The Chairman, Alderman D. C. Dewhurst, on behalf of the staff and workmen, handed to Mr. HARRY BLYTHE, Carbonizing Manager, a handsome music cabinet, in recognition of the esteem in which he is held. Mr. Blythe is taking up the position of Technical Assistant at Colwyn Bay.

Mr. CHARLES C. SMITH, B.Sc., of the Southall Works of the Gas Light and Coke Company, has been admitted as an Associate Member of the Institution of Chemical Engineers.

OBITUARY.

The death occurred at his residence in Teignmouth, on Thursday last, June 30, of Mr. G. HARDY HARRIS, Under-Sheriff of Devon, and Chairman of the Exeter Gas Company, the Board of which he joined in 1901, taking the chair three years later. He was between seventy and eighty years of age, and for some time had not been in the enjoyment of good health, though almost to the time of his death he was at his office attending to business.

"The Beacon and Homecraft Bulletin."—This is the title of a magazine compiled and edited by the staff of the Cleethorpes Gas Company. It is the intention of the Company to issue the magazine twice quarterly; and the first edition—a copy of which we have before us—is one of 3000 copies. We believe that the Company is the first in the country to adopt this particular publicity medium. Among the features of the paper are: "Local News and Coming Events," "Ladies' Page," "Everybody's Page," "Mainly for Men," "Children's Page," and "Gardening Notes."

LEEDS UNIVERSITY.

Examination Results—June, 1927.

The following degrees and diplomas have been awarded by the University of Leeds for the year 1926, in the subject of gas engineering:

Ph.D. Degree.—W. H. Blackburn, M.Sc., for a thesis on "The Removal of Sulphur Compounds from Gaseous Fuels by High Temperature Catalytic Processes."

B.Sc. Honours Degree—1st Class.—W. R. Branson, B.Sc., for a thesis on "The Effect of Ash Constituents on the Gasification of Coke in Carbon Dioxide." F. J. Dent, B.Sc., for a thesis on "The Influence of Ash Constituents on the Gasification of Coke in Air and Oxygen."

B.Sc. (Ordinary Degree).—J. M. Brown, B. Dean, W. Etheridge, R. G. Gibson, J. J. Priestley.

Diploma in Gas Engineering.—J. H. Dyde, B.Sc.; G. W Lee, B.Sc.; T. Spikins, B.Sc.

Mr. W. R. Branson is the son of the late Mr. Arnold W. Branson, of Hartlepool, and Mr. R. G. Gibson is the son of Mr. R. E. Gibson, Engineer and Manager to the Liverpool Gas Company.

INSTITUTION OF PUBLIC LIGHTING ENGINEERS.

Fourth Annual Meeting and Conference.

The Hon. Secretary of the Institution of Public Lighting Engineers, Mr. W. J. Liberty, informs us that he has made application to the Ministry of Health in respect of the expenses of the delegates attending the annual meeting of the above Institution at Brighton in September next, and that he has received a reply to the effect that the Minister sanctions under the Local Authorities (Expenses) Act, 1887, the payment of the reasonable expenses incurred in connection with the attendance of two delegates, one of whom should be the engineer or superintendent for public lighting in the district, in the case of any local authority whose accounts are subject to Government audit, and who may wish to be represented at the conference. Individual applications to the Minister for sanction in respect of the conference will not be necessary so long as the proposed expenditure is within the limits indicated.

Mr. Liberty states that, with the near approach of the date of the meeting (Sept. 12-15), it is necessary to know the number of members and others likely to be present, so that arrangements can be made for the comfort and convenience of those attending, especially with regard to the reception by the Mayor on Monday, Sept. 12, the luncheon to be given in the Pavilion on the 13th, the visits to the Electricity Works and the Gas-Works, and the Institution dinner.

FORTHCOMING ENGAGEMENTS.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

July 7.—SOCIETY OF CHEMICAL INDUSTRY (FUEL SECTION).—Coal cleaning conference, under the joint auspices of the Society, the Institution of Gas Engineers, and the Coke Oven Managers' Association, in the Medical Buildings, Edinburgh University, at 11 o'clock.

July 12.—FEDERATION OF GAS EMPLOYERS.—Meeting of Central Committee at the Hotel Cecil, 10.30.

July 12.—NATIONAL GAS COUNCIL.—Meeting of Central Executive Board at Hotel Cecil, 11.30.

July 12.—FEDERATION OF GAS EMPLOYERS.—Annual meeting at Hotel Cecil, 2.30.

July 12.—NATIONAL GAS COUNCIL.—Annual meeting at Hotel Cecil, 3.15.

July 22.—MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.—Meeting at Wentworth Woodhouse. Visit to the works of the South Yorkshire Chemical Company. Lunch at the invitation of the Right Hon. The Earl Fitzwilliam, K.C.V.O., C.B.E., D.S.O.

Aug. 16-17.—IRISH ASSOCIATION OF GAS MANAGERS.—Annual Meeting at Cork.

Sept. 7-9.—NORTH BRITISH ASSOCIATION OF GAS MANAGERS.—Annual general meeting in Dumfries.

Sept. 23.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Visit to the Torquay Works of the Torquay and Paignton Gas Company.

Sept. 30.—EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.—Annual meeting at Cambridge.

Oct. 3-5.—BRITISH COMMERCIAL GAS ASSOCIATION.—Sixteenth annual general meeting and conference at Southampton.

INSTITUTION OF GAS ENGINEERS.

July 11.—Emergency Committee.
Finance Committee.

July 12.—Education Committee.

ELECTRICITY SUPPLY MEMORANDA.

The Eclipse that Failed.

TIME was when certain of our electrical rivals talked in simple fashion of the coming eclipse of the gas industry by electricity. That was long before the war; since then, some with little vision and limited intelligence have still been harbouring the hope that electricity will eventually wipe the gas industry out of existence. What has happened? During the war the Government were very thankful there was a gas industry; the country has been extraordinarily thankful that the gas industry was alive, and keen to its responsibilities, during the coal stoppages of 1921 and 1926. The chemical industries are thankful there is a gas industry to supply them, from coal, with the materials they require. Agriculturists are also glad; road surveyors are pleased. The textile industries and mankind generally find employment and delight in the dyes which, through the operations of the gas industry, beautify our daily lives. The whole community show by increase in patronage that gas and coke are growing more and more popular day-by-day. The eclipse of the gas industry viewed from the standpoint of the present is being projected farther and farther from those things which are regarded as possible. The men of the electrical industry are now, if silence is a good basis for judgment, less convinced that their early speculation—that electricity could more than fill the place which the gas industry occupies—had any substantial or reasonable ground. In other words, they have learned that the gas industry is an indispensable part of the world's system.

The Retreat.

Judging from a discussion at the meeting of the Incorporated Municipal Electrical Association, not a few electrical engineers are drifting to the view (if they have not already reached it) that the cost of electricity using appliances and of electrical heat is too high for the contemplation of all-electric houses by the multitude. Therefore, it is imperative that some middle course should be pursued, in order to make headway with domestic electrification. Of course, there are some engineers who do not like the idea, who are reluctant to relegate their dreams of materialization to the dim and distant future, or who will not confess that electric heat is expensive. They still prefer the chimerical to the practical, and so renounce as something unorthodox the idea of a compromise such as was suggested by Mr. H. H. Berry in a paper at the meeting of the "I.M.E.A." What he proposes is a double system of heating, because of the prohibitive cost for general purposes of heat provided by electricity. But it must not be overlooked that his method does not solve the problem of the cost of installation—as a matter of fact, it makes it much worse, seeing that the dual system of heating means that the cost of the electrical installation will remain the same *plus* the expense of the general heating system. And apart from cost, many houses and flats cannot afford the space for a double heating system.

Double Heating Installation.

To be a little more specific, Mr. Berry's idea is that the ultimate solution of the domestic heating problem lies in the adoption of not one particular system as at present, but in a scientific combination of two or even more selected systems. Apparently he has not heard of the ability of gas to supply all the heat required, without labour, and through one set of pipes, in any house much more economically than electricity; but we will forgive him any lack of knowledge in this direction, inasmuch as his brain and time are so much occupied with matters electrical. His idea is that the constant heating load should be provided by heat generated by fuel in the home or its immediate vicinity; and that the intermittent heating load should be provided by electricity. The "constant" system would provide for the 52 weeks of the year all the hot water required at 160° Fahr. for domestic purposes; and for interior air heating (by convectors), at 55° Fahr., during 26 weeks. The intermittent system would be provided by electric pipes, which would "top-up" the temperature in the living rooms to 65° Fahr. A little sop to appease the "all-electric" advocates was thrown by Mr. Berry, when he said that in certain places, where the electric energy is cheap, electrically heated water may be introduced with considerable success. He did not define "cheap;" and he discounted the statement with the warning that great care is needed in the initial lay-out of such a scheme, in order that it may function at the maximum efficiency for a good type of load. He also remarked that much can be said in favour of local storage tanks; but the chief difficulty, from the consumer's point of view, is the limited hot water output, and the time lag in heating-up afresh. To mitigate as far as possible this trouble, the tank should be of fairly large capacity, to meet the maximum demand likely to occur during the day.

Restricting the Householder's Liberty.

There was at the conference some plain speaking by men and women who, electrical to their backbone, acknowledge that the day is not yet at hand when the "all-electric" house is for the major part of the community. We are glad to see even streaks of wisdom in this regard entering the minds of responsible electrical people. No doubt they would like to see their visions become realities. Such a doughty electrical champion as Mr. L. L. Robinson is inclined to advocate a system which allows the public to heat water and do their cooking by electricity during the summer, and to get back to solid fuel in the winter. Again, there is the heavy cost of the dual system; there is also, if coal is the fuel used, the smoke contribution at a time of the year when ardent reformers, or people who care for the health of the community, want to do all possible to prevent the ejection into the atmosphere of the polluting substance. Perhaps Mr. Robinson will think again; and the mental exercise may bring to mind another agent which will not pollute the atmosphere, and which does give people economically and efficiently the heat they need. Then there is Mr. George Wilkinson, who is of opinion that electricity undertakings might introduce the change circuit system for getting cheaper electricity—a circuit laid out in a circumscribed area, and taking, in a spasmodic way, the amount of energy which could be supplied between the normal and the top load. If there is one thing householders dislike, it is restriction. They want their heating agent always on tap up to full bore at all times; but electricians exhibit a strong desire to shape the householder's service and confine his liberty to what they consider expedient for the electricity undertaking. The householder will, of course, rebel against such a despotic system of doing business.

Dr. Ferranti's Bad Experience.

Just a few comments on some statements made during the discussion by Dr. Ferranti. He is not complimentary to Mr. Berry's proposed dual heating system. He looks upon it as a makeshift. Years ago he had practically the same method in use; but he says that he got fed-up with the fumes from the coke furnace. We are surprised that Dr. Ferranti, being an engineer, did not have his coke furnace constructed so that the fumes from the combustion of the coke went the same way as smoke from a coal fire—out into the open air—and not into the house. Coke-heated boilers are going in by their thousands in this country, using the coke provided by gas-works. The householders using them are not experts in the provision of hot water or central heating; but it is perfectly obvious that the coke-boiler would not have realized its great and growing popularity if users were, as Dr. Ferranti says he was, "fed up" with the fumes from them. At Dr. Ferranti's home, Baslow Hall, he has a private oil-driven electricity generating plant; and we understand that no other fuel is used. The whole, or a very large portion, of the heat of the engine jacket water and of the exhaust is used to supply the hot water storage in the house. In a case of this kind, it is stated that probably about 25 p.ct. of the fuel energy is obtained in the form of electricity; and the jacket water and the exhaust probably add another 50 p.ct. Dr. Ferranti has a storage battery containing about 2 tons of lead; and the hot water storage is a tank in the basement, 6 ft. in diameter and 6 ft. 6 in. long, with about 6 in. of insulation. This tank holds approximately 6 tons of hot water. We venture to say that, in such circumstances, Dr. Ferranti obtains his electricity and hot water supply at a rate much cheaper than the ordinary town dweller depending upon the public electricity supply mains.

Bitumen Gas.

No one likes to admit a fault, when it has occasioned destruction of life and property, if there is the slightest doubt. Sometimes efforts are made to escape from blame although the evidence appears to be abundantly clear. Take the Acton explosion in February last, which caused loss of life and wrecked property. It was called a "gas explosion." It was; but people jumped at the conclusion that it was coal gas; and it never entered their brains, through their limited knowledge of these matters, that coal gas is not, and has not been, the only sinner in this respect. There is bitumen gas, generated from the bitumen insulation of electric cables; and it is a gas deadly and of violent explosibility. Mr. G. Scott Ram and Dr. J. S. Haldane have been investigating, for the Electricity Commissioners, the Acton explosion; and no evidence was adduced which could place the catastrophe at the doors of the ordinary gas supply. But there was the evidence of fusion and trouble in the electrical mains. On behalf of the electricity suppliers, Dr. C. J. J. Fox made calculations as to the probable output of gas from the bitumen destroyed, founding

his computations on text-book data as to the gas productivity of pitch. And, on the strength of this, there was submission that the yield of gas could not have been sufficient to cause an explosion of the great violence experience. But Dr. R. V. Wheeler, who speaks authoritatively from long and far-reaching work in connection with gaseous problems, produced evidence of a more positive nature, which presented the case in a different light, and showed that the quantity of bitumen that had disappeared would, under given temperature conditions, yield ample gas to create highly explosive conditions. We await with interest the report of Mr. Scott Ram and Dr. Haldane. Meantime, any of our gas or electrical readers who require to peruse the fullest report of the inquiry that (so far as we have seen) has yet been published, will find it in the news columns of the last two issues of the "JOURNAL."

LONG-DISTANCE COKE-OVEN GAS SUPPLY IN GERMANY.

We have referred on various occasions to the ambitious scheme which is being advanced in Germany by the powerful Ruhr coal and steel interests, by which it is proposed to supply very large areas of the country with gas at high pressure from the Ruhr coke ovens. An esteemed correspondent has sent us a cutting from the industrial supplement to the "Vossische Zeitung" of June 15, which contains a summary of a long-promised public memorandum on the subject issued by the A.G. für Kohlenverwertung—the subsidiary syndicate who are the direct promoters of the project.

Referring briefly to present-day conditions of gas production in Germany, the statement mentions the difficulties which are experienced there by coal buyers with regard to coal brands, and which would be removed if the coal producers were also gas suppliers in bulk. [The power of such a group as the Coal Syndicate in Germany to sell coal according to "class," and the inability of the individual consumer to demand the brand of his choice, is, of course, one of the chief arguments from the latter's point of view against the central selling agencies which have certain advocates in this country.] Continuing their argument, the promoters claim that there can be no question of technical objections to gas distribution to whatever distances. They still, however, hesitate to give figures as to capital costs of pipe-lines, which, they rather obviously claim, depend upon the size of the area to be supplied. For a 500 mm. [19·69 in.] main the cost is estimated at Mk.75,000 per kilometre [about £6050 per mile]. Assuming an annual sale averaging 75,000 cub.m. [about 2½ million c.ft.] per hour at a distance of 400 kilometres [about 250 miles], this would amount to a transport cost of one pfennig per cub.m., or approximately 3·4d. per 1000 c.ft.

Considerable space is devoted to the question of the disposal of the coke that would be produced; and it is stated that much new construction of ovens would be necessary. As regards brown coal, which, it may be remembered, has a competitive gas supply scheme, it is considered that there are many technical and commercial difficulties to be overcome before it can be a serious rival. It is on the gas price question, which has given rise to much discussion and difference of opinion among all parties, that the sponsors of the scheme hold out their great inducement to the public. Upon their experience already obtained in the bulk supply business in the Ruhr district, they claim that gas manufactured at the pithead can be sold at about half the price of that produced in the ordinary way at gas-works.

In support of the contention that cheaper gas will induce increased sales, figures are quoted to show that consumption per head of population in the British Isles in 1925 was 178 cub.m., compared with only 51 cub.m. in Germany. It is emphasized that the scheme can only be carried through if it has the unanimous support of all coalfields and gas-works throughout the country.

By way of a start, four main arteries are proposed. One is to go from the Ruhr ovens through Bremen and Hamburg to Kiel. Another is to lead by way of Hanover, Brunswick, and Magdeburg to Berlin, and possibly from there on to Stettin. A third line is to go by way of Kassel through Thüringen to Saxony, whence it could be carried further by means of gas supplies from the Silesian and Saxon collieries. Finally, a line following the course of the Rhine is to lead to South Germany. It is intended that municipalities should be fully safeguarded by means of twenty or thirty year contracts against anything they might otherwise fear from the monopolistic nature of the supply.

Among the advantages which, it is claimed, will accrue to the municipalities may be mentioned: A regular supply of uniform gas at a price considerably below what they can touch in their own gas-works; no more anxiety as to coke disposal; no further capital expenditure on gas-works plants; closing of any gas-works which cannot be economically worked; and a diminution of atmospheric pollution. It is not intended to seek the co-operation of the State in this colossal venture, as it is considered that public interests are amply safeguarded by company law.

LONDON JUNIORS AT MARGATE.

Photograph taken on the occasion of a visit of the London and Southern District Junior Gas Association to the Margate Works of the Isle of Thanet Gas Light and Coke Company on June 11. An account of this visit was published in the "JOURNAL" for June 15, p. 690.

WATER GAS AND PRODUCER GAS PLANTS AT THE BILLINGHAM WORKS OF SYNTHETIC AMMONIA AND NITRATES, LTD.

After a thousand years of agricultural pursuits, the quiet hamlet of Billingham has been suddenly revolutionized. In his history J. R. Green relates how the Saxon tillers of the soil settled there on the basis of the family; Billingham being the "ham," or home, of the Billings. It is a fitting thing and a romantic sequel to its long uneventful history that the farm lands should be converted into a great fertilizer works. A new community led by highly skilled chemists and engineers has settled on the soil; and the past six years have witnessed wonderful technical achievements. The air, water, and natural wealth of Billingham are being harnessed to create products for the enrichment of agriculture over a great part of the world.

The works of Synthetic Ammonia and Nitrates, Ltd., at Billingham have been conceived on a grand scale. The large scale of its intended operations compelled the Company to experiment initially on a commercial scale, so as to make sure that in every department they would ultimately have the best possible equipment for their purpose. The preliminary experimental stage of the work in general having been completed, they proceeded to instal the first full-size units in their various departments about 1921, on an advanced experimental basis.

Modification of the Haber Process.

In their manufacture of ammonia by synthesis from its elements, the Company employ a modified form of the well-known Haber process. The Haber process consists in bringing the elements of ammonia—*i.e.*, hydrogen and nitrogen—together in their combining proportions, and subjecting them to high pressure and temperature in the presence of a suitable catalyst, so that they may unite chemically with each other.

Large quantities of hydrogen and nitrogen are required; and these are obtained by suitable treatment of water gas and producer gas, the water gas being used for its hydrogen content and the producer gas for its nitrogen content. This article describes the plant installed for the manufacture of the water gas and producer gas.

Initial Installation.

The first installation for water gas manufacture at Billingham consisted of a plant capable of gasifying 80 to 100 tons of coke per 24 hours, and comprised three water gas generators, with auxiliary plant.

As it was intended that the initial units of the water gas plant should eventually form part of the permanent plant, their design was considered on that basis; the main requirements being a high rate of gas production, ease of operation, reduction of labour, and conservation of waste heat.

To obtain this high rate of production, it was decided that hand clinkering should be eliminated by the provision of mechanical grates; and owing to the high air and gas pressure used, these grates are totally enclosed.

The main operating valves on the plant are hydraulically operated; all the valves of one unit being controlled from one point by means of balanced hydraulic control valves. These are arranged on a control board, which also contains all the gauges and instruments necessary to control the working of the plant, so that each unit is moved with a minimum of effort on the part of the operator.

Oil is used as the pressure fluid in view of its advantages over water in preserving the moving parts, and its non-freezing properties.

Efficient fuel distribution is effected by the provision of a special hand-operated coke feeder and distributor; each generator being provided with a double-headed jib crane having the rope running over the pulleys on each head. One end of the rope carries the distributing chute, and the other the generator feed door cover. The distributing chute and the door are made of equal weight to counterpoise each other. To charge a generator, the feed door is raised from its seating and swung sideways; the same motion bringing the distributing chute over the feed door frame. The chute descends in the feed opening until its special top curb rests on the feed door frame. The distributing chute is now revolved by hand gear while a weighed quantity of coke passes through it from an overhead hopper; the flow being controlled by a baffle plate.

Further to reduce labour costs, the generator is suspended from steel joists so that the bottom is raised above ground, thus enabling ashes and clinker to be discharged directly into trucks beneath. The ash discharge valves are hydraulically operated by valves in easy reach of the main control board.

The suspension of the generator is arranged so as to leave the bottom free, and thus it is possible to lower the bottom plate, with the mechanical grate and driving gear, to the ground when major renewals or repairs become necessary. Air and steam flow meters, pyrometers, and pressure gauges are provided for the scientific control of the plant.

The first unit was started up in 1923 without a hitch, and subsequent working has established that the generators as installed are well adapted for their purpose. Right at the outset remarkable operating results were obtained, of which particulars are given at the end of this article.

In this first installation the blow gases were led direct from the generator through a stack valve and chimney to the atmosphere. Provision was made, however, for the later installation of waste-heat boilers; and after several months' experience in the working of the first three generators, it was decided to add the waste-heat boilers, with auxiliary plant.

First Extension.

To meet the ever-increasing demand for water gas, an additional unit, complete with waste-heat boiler and accessories, was installed in 1925; its design following generally on the lines of the first three units. This unit was, however, designed to be operated by an automatic control machine. The provision of this fourth water gas unit did not ease the demands on the first three, as, before it was completed, the demand had again overtaken the normal output capacity. In fact, as the delivery of the automatic machine was delayed, the fourth unit was put into action with the hydraulic connections temporarily coupled up to the hand-operated control board of

Fig. 1.—Self-Clinkering Grate.

No. 3 unit, and the unit was operated in parallel with No. 3 unit until the automatic machine was installed.

The automatic control machine for No. 4 unit was erected and set to work in July, 1926. The machine was the first of its kind, and operating experience proved it to be built on sound principles. Similar machines were ordered with subsequent extensions.

Second Extension.

The Company had now proved the process, and decided to extend the whole works. They accordingly ordered another five water gas generating units complete with waste-heat boilers, bunkers, and the building for supporting and housing them, during 1925. These later units contain certain new features in addition to the automatic control machines. These consist of low-pressure boiler jackets for the generators, automatic feeding gear for the generators, high-pressure waste-heat boilers for steam at 275 lbs. per sq. in., and superheaters to superheat the steam from the waste-heat boilers capable of giving a superheat of 236° Fahr., thus equalling a total temperature of 650° Fahr. Special attention has been given to the metals or alloys employed in all vital parts, taking advantage of developments in heat-resisting alloy steels and iron.

Third Extension.

This work had not been long in the contractors' hands when the Company decided that still another three generators should be put down, making the plant, when this order is completed, consist of twelve water gas units capable of gasifying over 400 tons of coke per 24 hours.

Producer-Gas Plant.

The experience gained with the initial installation of water-gas generators satisfied the Company that a supply of pro-

ducer gas, with its nitrogen content, would be a valuable addition to the water gas if it were mixed with the latter in the right proportion. The Company accordingly arranged for two mechanical gas producers to be installed in 1924. A further gas producer was installed during 1926, and another similar producer is now being constructed.

The water gas plant and the producer gas plant in their latest form, and incorporating all the latest developments, are described in the following notes.

CONSIDERATIONS AFFECTING DESIGN OF WATER GAS PLANT.

Means must be provided for feeding the generator with fuel to make up for what is used in gas making. Means must also be provided for removing the ashes and clinker, which are the incombustible matter in the coke. The fuel bed must be kept of the same density throughout, so that the steam and air spread equally over the whole area, and do not tend

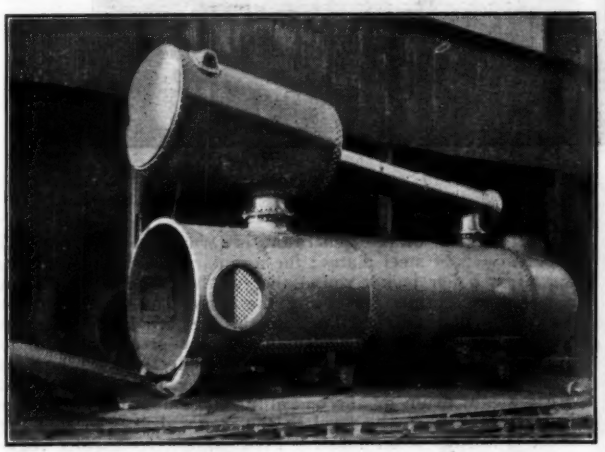

Fig. 2.—Waste-Heat Boiler and Steam Drum in Maker's Works ready for Dispatch.

to short-circuit through open channels in the bed. The tendency of the ash to melt and become a sticky mass adhering to the walls or grates of brick-lined generators, and even to combine chemically with the material of the walls, must be guarded against. The blow gases and the water gas leaving the generator are hot, and so take from the generator a considerable amount of sensible heat, and they also contain a fair amount of potential heat in the form of carbon monoxide. Means must therefore be provided for recovering this sensible and potential heat before the gases leave the plant. The gases carry forward from the generator a fair amount of dust, and this has to be eliminated.

Besides caring for these matters, provision must be made for the continual opening and closing of valves and for keeping them tight against hot and dusty gases, and for ensuring that they work in the right sequence.

All these requirements are met in the plant at Billingham, each unit of which can be set to work by merely pressing a button. Once set to work, each unit then continues to help itself to coke, steam, and air as it requires them, and to turn out gas as long as the supply of raw material lasts. Gas making is only arrested for a few minutes at a time to permit of the discharge of ash, such discharge taking place two to three times per diem. Every six to twelve months each generator should be stopped for a general clean-down and overhaul of component parts.

The latest type of water gas generator now about to be put to work is the subject of several patents owned by or applied for by the Power-Gas Corporation, Ltd., the designers and contractors for the whole installation.

GENERAL DESCRIPTION OF WATER GAS UNIT.

A unit consists of an overhead bunker and shoot, automatic feeding gear, a water gas generator, a combustion chamber, a waste-heat boiler, washer, and an automatic control machine. The bunker stores the coke overhead; the automatic feeding gear supplies the coke to the generator in a continuous flow; the generator contains the incandescent coke from which the water gas is made; and in the combustion chamber the combustibles in the blow gases are burnt by a supply of secondary air to convert their potential heat into sensible heat. In the waste-heat boiler the sensible heat from both the water gas and the blow gases generates steam. The steam is led back to a superheater in the combustion chamber. The blow gases escape to the atmosphere through a stack valve and chimney after passing through the waste-heat boiler, and the water gas goes on through a washer to be cooled and freed from dust before going forward to a holder for storage. The whole of the working is governed by the automatic control machine.

An overhead crane can run the full length of the building, for general use during the periodic overhaul of the various parts of the plant.

A coke storage bunker is placed overhead, and is fed by means of skip-type elevators and belt conveyors having movable throw-off carriages for distributing the coke throughout the length of the bunker.

The distributing and collecting mains for air, gas, low-pressure steam, high-pressure steam (both saturated and superheated), exhaust steam, feed water, cooling and sealing water, and for live and exhaust pressure oil are all placed where they are easily visible and accessible.

The fans providing the air supply, the pumps and accumulators for the oil supply, and certain electrical equipment of the automatic control machine are housed in a separate building and are coupled-up to their respective mains. The water gas is sent direct from the gas washer through a collecting main to the holders, whence it is distributed as required.

The high-pressure steam from the waste-heat boilers is led to the general works supply mains. The low-pressure steam from the water jackets is led to the low-pressure main feeding the generators. The low-pressure main also receives exhaust steam from the grate engines, thereby reducing the power consumed for the drive. Any deficiency in the quantity required to feed the generators is supplied by low-pressure steam from other sections of the works. The low-pressure main is at a pressure of 15 lbs. per sq. in.

COKE HANDLING PLANTS.—FIRST INSTALLATION.

The coke handling plant installed by the Company to deal with the fuel for the three water gas generators of the original installation was given careful consideration; and it was decided to make it automatic in operation as far as possible, to reduce labour costs to a minimum.

The coke is elevated to the storage bunkers above the generators by a completely automatic skip hoist having a capacity of 20 tons per hour; the net vertical lift being 135 ft. The skip bucket discharges its load into an elevated receiving hopper provided with two outlets, from which the coke is fed to crushers at a constant rate by oscillating feeder plates directly connected to, and driven by, the crushers. The latter have each a capacity of 20 tons per hour, and are provided in duplicate to enable renewals to be carried out without the necessity of stopping the plant.

Under each crusher is mounted an oscillating inclined screen which removes all small coke less than ½ in. in diameter; the remainder passing over the end of the screen into a chute which delivers it in a constant stream on to an 18 in. rubber belt conveyor running at a speed of 300 ft. per minute. De-

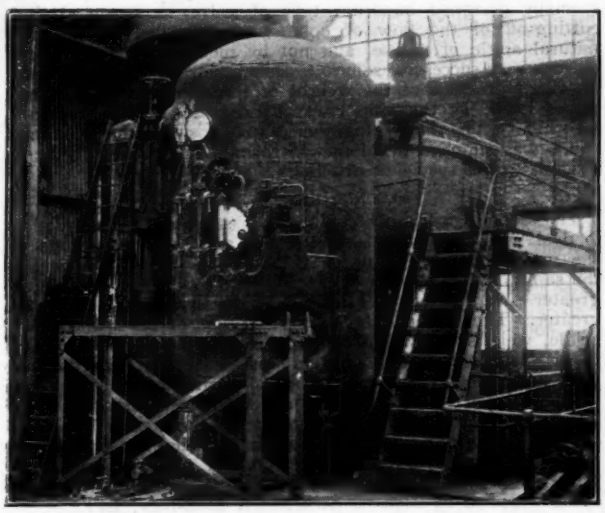

Fig. 3.—The Upper Part of Boiler and Steam Drum in Operation.

livery of the coke to any point in the length of the parabolic bunker is effected by a movable tripper.

The skip hoist is driven by a 20-H.P. electric motor, which is used for hoisting the load only; the return being by gravity under the control of a pneumatic governor. The hoist is thus what is generally termed "unbalanced"—*i.e.*, no attempt is made to counterbalance the dead weight of the skip, which, in this case, with its bridle, amounts to about 1 ton. One of the advantages claimed for the unbalanced type of automatic hoist is the relative simplicity of the electric control gear.

The top and bottom positions of the skip are controlled by electric cut-outs, which are struck by the skip itself; and variable factors such as rope stretch therefore have no effect on the working of the hoist, and do not require provision for adjustment. In addition to these, overwind cut-outs are provided to operate in the event of failure of the regular cut-outs. After striking the top cut-outs, which through an auto-

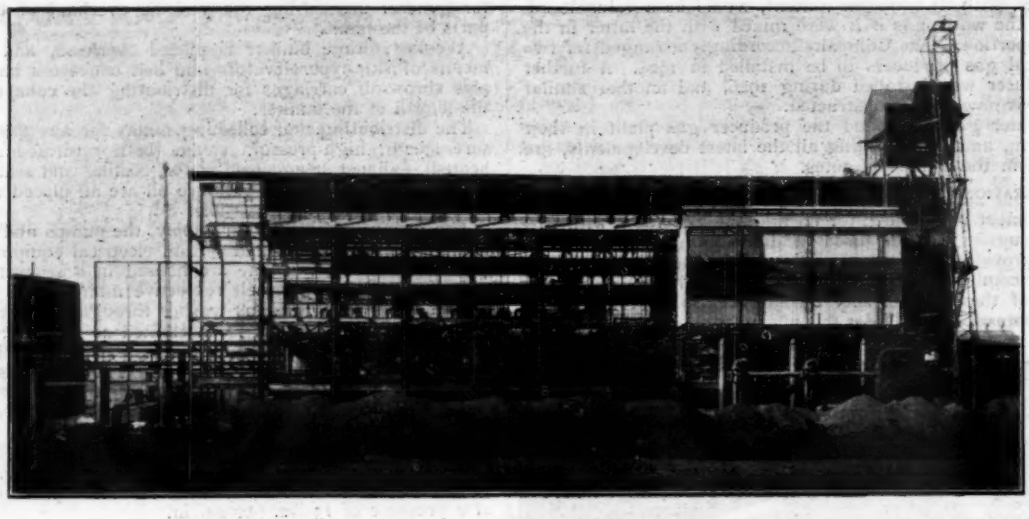

Fig. 4.—Photograph taken during erection, showing one of the Skip-Type Elevators and the Overhead Bunkers. The bunkers have been completely housed-in since the photograph was taken. Part of the gas producer building is shown in this view at the right-hand end.

matic contactor switch break the motor circuit, the skip quickly loses speed, and stops; but the tension in the hoisting rope due to the dead weight of the skip immediately causes the gearing to revolve in the opposite direction, and thus lower the skip. An automatic pneumatic governor on an extension of the motor shaft controls the speed of descent.

The motor is of the slip-ring type; and runs at constant speed, but the speed of the skip is arranged mechanically to be least when at the bottom, rising to a maximum when near the top, after which it comes gently to rest at the tipping position. The low speed of the skip when at the bottom of the hoist is important in avoiding violent opening and closing action of the valve. In the plant described, the average hoisting and descending speed of the skip is 100 ft. per minute; but the speed of the skip when it is opening and closing the valve is only about 25 ft. per minute, thus giving a very gentle action.

The problem of automatically filling the skip from the ground hopper was expected to be difficult of solution, as the largest lumps of coke were about 14 in. cube; but a specially designed quadrant type of valve so arranged that cutting-off of the flow of coke was controlled by its own natural angle of repose, and not by mechanical cut-off, provided a very successful solution. The quadrant valve is opened by direct pressure of the weight of the descending skip, and closes itself, as the skip rises, by means of counterbalance weights. The hoist, together with most of the auxiliary plant, was supplied by Messrs. Strachan & Henshaw, Ltd., of Bristol, to the special instructions of the Company.

Second Installation.

The second coke hoisting plant at present under construction to deal with the fuel for the second and third extensions of the water gas and producer plants is, in general principle, the same as that already described, but the capacity is 50 p.ct. greater—*i.e.*, 30 tons per hour—and the height of lift 20 ft. greater. The skip carries nearly two tons of coke, and, with bridle, weighs 27 cwt. The top receiving hopper is designed to receive coke from two adjacent skip hoists (of which the one now under construction is the first) each having a capacity of 30 tons per hour, and each able to deliver, through regulated outlets, to either of two crushers, again each having a capacity of 30 tons per hour. Balanced oscillating screens and rubber belt conveyors are mounted under the crushers as described in connection with the first plant. This plant is also being supplied by Messrs. Strachan & Henshaw, Ltd.

Coke Weighing Machines.

An accurate record is kept of the amount of fuel fed into each generator; and to enable this to be done, four weighing machines of a special type have been installed. The machines are of the travelling type, and are motor driven; each machine being fitted with a recording mechanism which prints on a chart the weight of each charge and the number of the generator receiving it. The machines run on rail tracks which extend the full length of the generator house immediately below the bunkers. The tracks are supported on substantial steel joists, to which the chutes above the generators are also attached.

The coke is fed into the machines through outlet doors on the underside of the bunker; and before it is discharged into the chute the operator records the weight by lifting a small lever.

Water Gas Generator.

The generator (fig. 5) is hung from brackets supported on the building structure. The main portion of the sides, round the hottest zone of the generator, is formed of an inner and an outer wall of steel plates; the annular space between them forming a boiler jacket round the fuel bed, and presenting a cool wall to it, thus preventing the clinker from adhering to the walls. The radiant heat from the fuel bed is conserved in the water jacket by the generation of low-pressure steam to supply the process. In order to serve effectively both as a water jacket and a steam raiser, the water jacket is provided with a steam drum on the operating stage above. The water is maintained up to its level in the steam drum, so that the jacket is always water filled. Feed pumps, feed water regulators, safety valves, gauges, and all the fittings usual to a steam raising plant are provided. The blow-off pressure is 15 lbs. per sq. in. The upper portion of the generator side and the top are lined with firebricks, and above the top plate is a water jacket in the form of a shallow tank, to prevent radiation of heat to the operating stage. Pokeholes closed by conical shaped plugs are arranged through the top. These holes are used for testing the bed for ash and clinker.

Self-Clinkering Grate.

The fuel bed is supported on a slowly revolving mechanical grate of the Lymn-Rambush patent design (fig. 1), constructed of hematite, with renewable hardened conical steel plates on the faces subject to wear. The special contoured helical upper surface raises and lowers the fuel bed at intervals, thus constraining the mass into a homogeneous density, while the general conical formation of the grate tends to move the lower stratum from the centre to the sides, where it falls between a wearing strip on the bottom of the water jacket and the specially shaped sides of the mechanical grate. Here it is crushed by the rotation of the grate to a suitable size for removal.

The revolving table carrying the grate also carries the crushed material round to the ash boxes, into which it is swept by projecting ploughs set across the path of the crushed clinker. It is important that the ash should not be removed at too great a rate, and that there should always be sufficient non-combustible material round and above the grate to protect it from the fierce heat of the coke. The rate of extraction can be regulated by the speed of the engine, by the position of the ploughs, or by intermittent working of the grate. The ash is allowed to remain in the ash-boxes for some time; and here it is cooled by the steam, and discharged in a dry state. The grate and all revolving parts are supported on the bottom plate of the generator. The shape of the bottom plate conforms to the space occupied by the gearing for the grate, reducing the dead space between the revolving table and the bottom plate to a minimum. The bottom plate is bolted to the bottom curb of the generator shell so that it, together with the revolving table and grate, can be lowered bodily to the ground if necessity arises.

The revolving table and grate are driven by a steam engine and friction and spur gearing, passing through the bottom plate, and by a circular rack under the revolving table. All lubrication of internal parts is effected from the outside. The ash boxes are plain receptacles, two in number, fitted with hydraulically-operated discharge doors on the bottom.

Air enters under the generator bottom and passes through the louvres on the grate and through the fuel bed, and the blow products leave the generator at the outlet on the side of the generator near the top. The luted joint between the rotary portion of the grate and the stationary generator bottom prevents air from short-circuiting outside the grate casting.

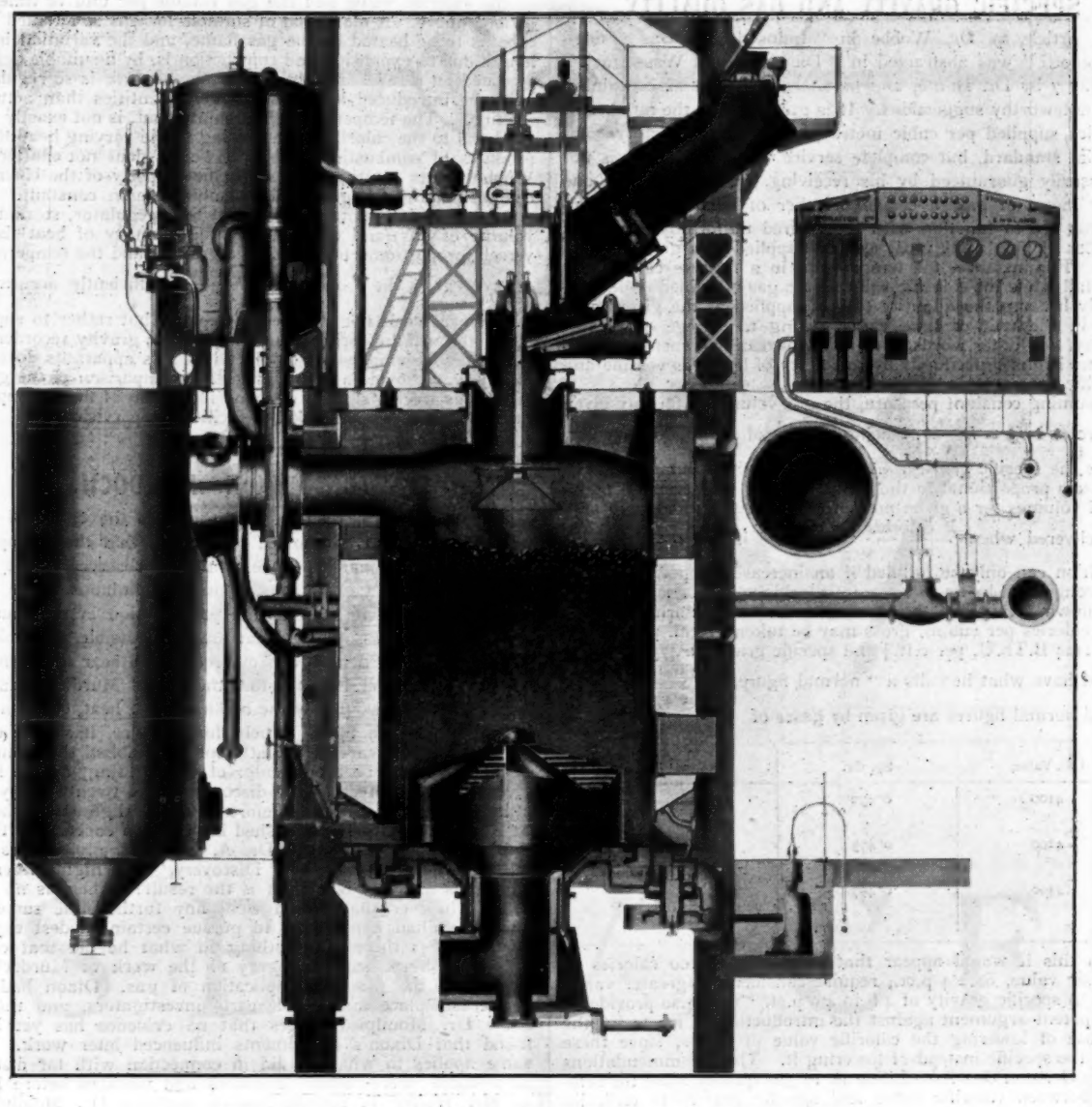

FIG. 5.—SECTIONAL ELEVATION THROUGH A WATER GAS GENERATOR.

AUTOMATIC FEEDING GEAR.

Mechanical devices for automatic and continuous feeding of coal to producer gas generators are numerous, but none of these is applicable to the feeding of water gas generators, mainly because the pressures used in water gas practice are so very much higher, as is also the value per unit volume of gas lost (due to leakages). Further, coke is a considerably more abrasive fuel than coal. In addition it should be borne in mind that the water gas quality is much higher and more uniform in quality if the fuel depth is maintained constant. Therefore it is clear that the coke fuel is best supplied to the generator in single pieces at a time, and not in bulk, as is the common practice.

The arrangement of gear as installed in the plant at Billingham has been designed to cover the conditions mentioned. It consists in the main of a gas-tight receiver, having top and bottom valves for taking in the coke in bulk, and a mechanism whereby this receiver is gradually and slowly emptied of its content, which is deposited evenly and at an even rate over the top surface of the generator charge. When the total charge of the gas-tight receiver is emptied into the generator, the machine automatically re-charges the receiver with a fresh bulk of weighed coke.

The coke fed from the bunker into a weighing machine is discharged from the latter into a small receiving chute arranged above each generator. The chute is fitted at its bottom end with a hydraulically operated stop plate. Immediately below this stop plate is arranged an upper valve of the gas-tight coke receiver. This valve is of the sliding type, having a manganese steel seating. The coke receiver is of about 1 ton capacity; and at its lower end is fixed an inverted disc valve (also with manganese steel seating) which is arranged to open into an intermediary chamber allowing for a free passage of the coke flowing through the valve.

From this chamber the coke is arranged to fall on to a shaker plate, the stroke and inclination of which can be adjusted to set the rate of discharge of coke from the receiver into the generator. Falling from the edges of the shaker, the coke is dropped on to a revolving cast-steel distributor having a hole and cone deflector to enable the pieces of coke to be discharged evenly over the fuel bed.

The distributor is adjustable in a vertical direction, and, further, its lower edge is made so that it can be closed gas-tight against a seating, thereby enabling repairs or overhaul to be carried out on the upper part without stopping the generator.

The method of automatically charging the gas-tight receiver when emptied consists of a " depth rod " which is continuously raised mechanically and allowed to fall by its own weight on top of the coke in the intermediary chamber between the gas-tight receiver and the shaker plate. The " depth rod " is provided at the top with gears of a special type for lifting it, and at its lower end has a plate which is broad enough to prevent its passing through the coke mass when it is allowed to fall on to it. So long as the chamber is full of coke, the " depth rod " only falls, and is lifted back again on the upper path of its full stroke. As soon as the intermediary chamber is emptied of coke the depth rod falls to the lowest point of its full stroke. As soon as this stage is reached, the upper end of the rod engages a clutch which puts into operation a series of cam shafts operating hydraulic pilot valves in such a sequence as to enable the valves on the receiver and on the coke chute being opened and closed in their proper sequence without loss of gas to the outside.

(To be concluded.)

" Standard " Gas Cookers.—We see from a report which has been made that Nos. 2 and 3 sizes of " Standard " cookers are the most popular. Up to Dec. 31 last, 6743 No. 3 cookers were sold; 6207 No. 2; 637 No. 1; and 413 No. 3 (eye-level).

SPECIFIC GRAVITY AND GAS QUALITY.

An article by Dr. Wobbe in "Industria del Gas e degli Acquedotti" was abstracted in "Das Gas- und Wasserfach" of May 7 by Dr. Bunte, and he characterized it as containing very noteworthy suggestions. It is granted that the number of calories supplied per cubic metre provides a satisfactory commercial standard, but complete service to the consumer is not necessarily guaranteed by his receiving, for the price of one cubic metre of gas, a certain number of heat units. If apparatus are to function with the desired uniformity, an equal number of heat units must also be supplied in a given unit of time. For instance, the temperature in a furnace could quite well fall while the calorific value of the gas remained unaltered, simply because the quantity of gas supplied at the given pressure in the unit of time varied owing to change of specific gravity. In other words, a constant heat development per unit of time is guaranteed only by constancy of both gas volume and calorific value.

Assuming constant pressure, the gas volume Q for any given apparatus is $Q = k \frac{1}{\sqrt{s}}$, k being a factor of the burner aperture, and s the specific gravity. As, therefore, the volume of gas is inversely proportional to the square root of the specific gravity, equal volumes for a given pressure and a given nozzle will only be delivered when $\frac{k \text{ calories per cub.m.}}{\sqrt{s}}$ is a constant. This condition can only be fulfilled if an increase in specific gravity is accompanied by an increase in calorific value, or *vice versa*.

Following this hypothesis of Dr. Wobbe, a normal gas of 4200 calories per cub.m. gross may be taken [1 cal. per cub.m. = 0·1124 B.Th.U. per c.ft.] and specific gravity 0·475, and this would have what he calls a "normal figure," $\frac{4200}{\sqrt{0{\cdot}475}} = 6100$. Equal normal figures are given by gases of

Cal. Value.	Sp. Gr.	Normal Figure
4100	0·452	$\frac{4100}{\sqrt{0{\cdot}452}} = 6100$
4200	0·475	$\frac{4200}{\sqrt{0{\cdot}475}} = 6100$
4300	0·497	$\frac{4300}{\sqrt{0{\cdot}497}} = 6100$

From this it would appear that variations of 100 calories in calorific value, or 2·4 p.ct., require considerably greater variations in specific gravity of 4·6 to 4·9 p.ct. This also provides a very potent argument against the introduction of inerts for the purpose of lowering the calorific value of a gas, since these raise the specific instead of lowering it. The recommendations of the German Gas Association as to gas quality leave the relation between calorific value and specific gravity to each individual works. It depends largely, of course, upon the method of production. Dr. Bunte suggests, in the light of Dr. Wobbe's argument, that a recommendation might well be added regarding the advantage of maintaining constant the value $\frac{\text{calorific value}}{\sqrt{s}}$. Dr. Wobbe is of opinion that a 10 p.ct. variation is permissible.

The following table, compiled by Dr. Wobbe, shows the effect upon this value of the various gas constituents, and it is of use in indicating what measures can be taken to maintain the constant. It shows, for instance, which gases have more effect upon the specific gravity, and which upon the calorific value.

	Sp. Gr. s.	Cal. Value. Gross P.	Cal. Value. Net.	Theor. Comb. Temp.	Normal Gas $\frac{P}{\sqrt{s}}$.
N_2	0·9674	..	..	..	..
CO_2	1·5288	..	..	..	..
H_2	0·06949	3,052	2,570	1885°	11,604
CO	0·967	3,034	3,034	2030°	3,077
CH_4	0·553	9,527	8,562	1795°	12,787
C_2H_2	0·898	13,832	13,350	2110°	14,606
C_2H_4	0·967	14,903	13,939	1920°	15,098
C_6H_6	2·694	34,423	33,978	1860°	21,002
Distilled gas—					
Dry	0·44	5,129	4,576	..	7,724
Moist	0·45	7,639	4,142	..	6,903
With 40 p.ct. water gas	0·47	4,192	3,769	..	6,100
Double gas	0·50	3,270	..	..	4,625
Water gas	0·53	2,800	2,573	..	3,846
Producer gas—					
From coal	0·94	1,086	1,039	..	1,160
From coke	1·00	939	931	..	939

Wobbe describes an apparatus, which has been in use at Bologna for a number of years, which permits of a control of the yield of heat, or whatever name may be given to the quotient of the calorific value and the gas volume per unit of time described above. A metal rod of suitable form is so situated in a tube as to be heated by the gas flame, and the variation in its length due to expansion and contraction is, by a suitable device, recorded on a revolving drum. Combustion air is so regulated as to be introduced in slightly larger quantities than actually required. The temperature, it is pointed out, is not exactly proportional to the calorific value, owing to the varying heat of the products of combustion. This, however, does not matter, as Wobbe points out that it is a specific property of the chemical composition of the gas, which should remain constant. The gas pressure is maintained constant by a regulator, so that the volume of gas (and consequently the quantity of heat) is inversely proportional to the specific gravity, and the temperature recorder gives the proportion $\frac{\text{cal. value}}{\sqrt{s}}$ sufficiently accurately. The apparatus is not intended to replace, but rather to supplement, the usual calorific value and specific gravity recorders.

Dr. Wobbe emphasizes the fact that this apparatus does not in any way provide a standard for the comparison of the gases of various works, since it gives no indication of flame temperatures. It is merely intended to facilitate supervision.

CLAYTON—DIXON—MURDOCH.

There is a danger (which ought not in the cause of historical accuracy to be allowed to develop) that the championship of this or that early investigator or observer of the fact that coal would yield a gas giving a luminous flame will somewhat blur actual merit and participation in the foundation of public gas supply. That must, if possible, be avoided. It has never been denied, and our records all bear testimony to the fact, that several men before the day of Murdoch had observed that coal would, by the application of heat, evolve a gas which would give light. Much, for instance, has been done in the last few years in the attempt to establish the claim of George Dixon to be the inventor of gas lighting, and to have given practical effect to the discovery some twenty-two years (thirty is now mentioned) before Murdoch lighted his house at Redruth. We have published information concerning these claims in the "Journal;" Dr. A. T. de Mouilpied does the same in the June issue of "Discovery," and highly interesting is his article. But what is the result? There is no evidence whatever that Dixon went any further—the same as other men had done—than to pursue certain modest experimental lines; there was nothing in what he did that could be placed in the same category as the work of Murdoch in developing the practical application of gas. Dixon had his honourable place among the early investigators, and that is all. Dr. Mouilpied agrees that no evidence has yet been found that Dixon's experiments influenced later work. The same applies to what he did in connection with tar distillation—there were other inventors and workers before him, as Mr. Walter T. Layton has (in noticing Dr. Mouilpied's article) pointed out in the South Metropolitan Gas Company's "Co-partnership Journal." In his article, Dr. Mouilpied also makes gracious reference to Mr. Layton's book on "The Discoverer of Gas Lighting"—the Rev. Dr. John Clayton (1657-1725). The plodding research in which Mr. Layton engaged before writing that book (which is published from the office of the "Journal") deserves the utmost recognition; by it he has contributed largely to our knowledge of the life and work of the eminent divine. Dr. Mouilpied states that "the facts are set out for the first time with scholarly thoroughness and with much charm." He also says:

> Viewed in the light not of an isolated observation, but of a series of steps logically conceived and skilfully executed, the Rev. John Clayton was the first to place on record that the destructive distillation of coal yields an inflammable gas insoluble in water—a gas which can be separated from the water and tar produced, collected, stored, delivered under pressure, and ignited at the point of liberation. These are indeed the essentials of modern practice. There is no indication in the papers quoted that Clayton thought of putting coal gas to any practical use; but all may agree that he did enough for fame and for grateful and permanent recognition.

There is a great deal of difference between discovery, experiment, and invention of practical methods of realizing and applying a discovery. Mr. Layton in the "Co-partnership Journal" makes this clear when he writes: "Dr. Clayton gave us the first account of the distillation of coal to produce a gas which could be collected, washed, stored, and used for producing light. Dixon seems to have gone beyond Clayton in carrying the gas by pipes—hemlock stems, it is said—a few feet from his miniature gas-works. Murdoch began by conveying his gas through metallic tubes, and proceeded to develop his methods of manufacture and distribution with the genius of an inventor and the practical skill of an engineer." There we have what appears to be the perfectly fair allocation to each worker of his part in the great development from which the gas industry has grown and flourished.

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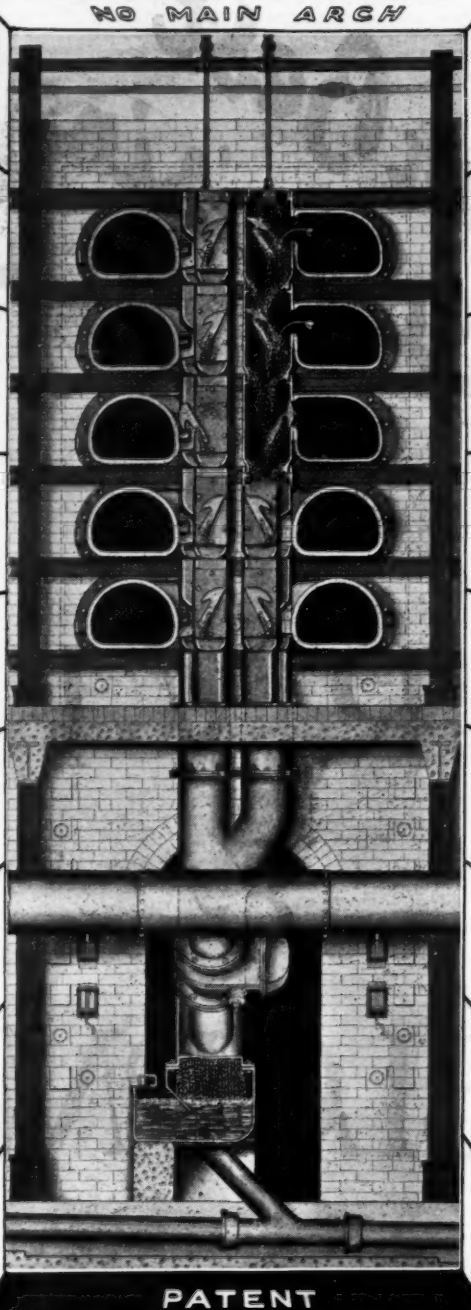

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EDUCATION AND INDUSTRY.

The Recruiting of the Young Employee.

The Ninth Annual Conference of the Association for Education in Industry and Commerce was held on Wednesday and Thursday of last week in the Gas Light and Coke Company's Showrooms, Church Street, Kensington, W.—under the Presidency of Sir DAVID MILNE-WATSON, LL.D., D.L.; the principal subject for discussion being "The Recruiting and Training of Young Employees in Industry and Commerce."

The delegates having been welcomed to the Royal Borough of Kensington by His Worship the Mayor (Alderman R. Dudley Baxter, J.P.), the retiring President, Alderman George Cadbury—who happens to be a member of the Birmingham Corporation Gas Committee—made gracious reference to the qualifications of the new President for the position, and to the work which the Gas Light and Coke Company and the gas industry generally are doing in connection with education. Thereafter, Alderman Cadbury was cordially thanked for his services as President, on the proposition of Mrs. Cloudesley Brereton, seconded by Captain P. J. Pither. The Association could not, said Mrs. Cloudesley Brereton, have done the work it has done, but for the support of Alderman Cadbury and his firm. The election of the Right Hon. Lord Riddell as Vice-President for 1927-28 was agreed to; and then followed the Presidential Address.

ADDRESS OF SIR DAVID MILNE-WATSON.

It is a great pleasure to me to be able to welcome you to Church Street to-day and to acknowledge the honour you have just done me in electing me as your President for 1927. For two reasons it seems to me appropriate that we should discuss the recruitment of the young employee at these offices. First because there is a great deal of fog surrounding the all-important change from school to industry, and one of the services which the gas industry is rendering to the community is to make the atmosphere clearer. Secondly, because the gas industry is so intimately connected with the whole life of the country that we who work in it have, or should have, a broad outlook on all the different problems affecting industry.

RECRUITING THE YOUNG EMPLOYEE.

The subject of our discussion to-day is of particular interest to me personally, since, as some of you may know, I have the privilege to sit as a member of Mr. Malcolm's Committee on Education and Industry. We have already issued a report, which might well have been entitled "The Recruitment of the Young Employee;" and no doubt during the next few days passages from it will be used in evidence against me. The Committee are now engaged in examining "the public system of education in England and Wales in relation to the requirements of trade and industry." It would not, I think, be fair to my colleagues, if, before the publication of our next report, I expressed any very definite convictions on the subject of our inquiry; but Mr. Malcolm will not, I hope, object if I give you, for what they are worth, one or two thoughts on the question with which we are concerned to-day:

> What kind of education do we want, and how are we to ensure that the boys and girls who come into our works and offices actually get that kind of education?

INDUSTRIALISTS AND EDUCATION.

As industrialists, we have a very definite right to make ourselves heard on this subject—and this for two principal reasons. First of all we pay the piper. We are rated and taxed to provide for the national system of education (and I am not complaining of that; indeed, it is our privilege to do something more for education). Many of our great public schools, most of our old grammar schools, owe their origin to the generosity of the merchant community—Mercers, Merchant Taylors, Grocers, Goldsmiths, and so on—and, while it is true that in the nineteenth century industry largely abdicated its position as the special patron of education, I am glad to see that once more the greater industries of this country are beginning to take a prominent part in the provision of special educational endowments.

We can find many examples of benefaction in this country, though to single-out the munificence of particular individuals or firms would be invidious. Besides the gifts of great corporations, there are "widows' mites," which represent no less generosity on the part of smaller firms; and if I were to enumerate even the larger contributions to the universities and schools of the country made by industry during the past few years, the list would be a very long one indeed. Chairs and scholarships have been founded, laboratories have been built, research has been endowed; and I look confidently for further efforts of this kind on an increasing scale in the future.

To-day it is our special task to consider the elementary, secondary, technical, and continuation schools, and the like sources from which we draw the great majority of our young employees.

We have a second special right to be heard on the type of training provided by these schools because employers are in the best position to know what kind of workers will make for the prosperity of our factories and, therefore, for that of the districts in which they are situated. This knowledge carries with it a definite responsibility to the community and to the schools which are in a very real sense Our Schools. That responsibility means that we have not merely a right, but a duty, to help in securing a suitable curriculum and a wise atmosphere in the schools. I do not propose to-day to enter into the details of the kind, or the various kinds, of education that we wish to encourage—to do so would be to foreshadow the next report of Mr. Malcolm's Committee; but there are a number of points on which, I think, we can all agree.

SPECIALIZED TRAINING AND GENERAL EDUCATION.

Many of us need specialized training for our workers, but some of us feel that this, after all, may be of secondary importance, and that what we all want is character, a sense of discipline, and that general intelligence and aptitude which are perhaps best encouraged by cultural, rather than by technical, education. It is a commonplace that the development of machine processes, which is still going on, is steadily changing the demand for unskilled labourers into a demand for skilled operatives to control machines and for mechanics to repair them; and what is true of industry is true also of the democracy of to-day—level headedness, adaptability, and general intelligence have come to be the qualities of primary importance.

Now the whole difficulty about these qualities lies in their indefiniteness. It is easy enough to put an extra hour of arithmetic into the curriculum of a school, or to take it out again, but discipline and the training of general intelligence cannot be measured out in spoonfuls. Our interest in the schools and our knowledge of their work must be very close and practical before we can see whether these qualities are being successfully inculcated and encouraged. Only a very close contact with the boys who leave a school can tell us whether its atmosphere has definitely a clerkly bias, or whether there is a wise discretion in guiding different types towards the employment for which they are best suited. And what is more hopelessly pathetic than the would-be clerk who degenerates slowly through a lifetime of temporary jobs in an occupation for which he is totally unsuited?

How are we to secure this close contact? First of all, decentralization and local work within the limits of the national system are, in certain respects, of no less importance than standardization in others. On the one hand, standardization on national lines is desirable in such matters as examinations. It may be true, for instance, that there are far too many examinations by different bodies covering the same ground, so that both the examinee and the employer are uncertain of their value as a qualification for employment. A Committee, on which the gas industry is represented by Mr. F. W. Goodenough, has in fact been recently appointed by the President of the Board of Education to inquire into this very point. On the other hand, along the broad lines of policy local needs can really only be studied by local people. Particular firms should, therefore, be in close contact with the Education Officer of the local authority of the area from which they draw their employees, and in most cases with the one or two schools from which come the bulk of their lower-grade employees.

CHOOSING A CAREER.

Again, it is all important that employers should take part in, and make use of, the national system for advising boys and girls on the choice of a career, and for finding them employment, the scope and effectiveness of which system I had not appreciated before I was appointed to serve on Mr. Malcolm's Committee. It should be possible for a welfare supervisor, or an employer himself, to be a member of the Local Juvenile Advisory Committee, both in the interests of his own firm and in those of the boys and girls whose future as useful citizens and employees may be made or marred by the advice they receive on leaving school, and by the character of the first job which they enter.

As a corollary of this contact, it is important that the engagement of boys and girls should not be left, as it is by many firms, in the hands of those who have not the right experience, and tend in consequence to deal with the matter far too casually. The prosperity of any firm must be based largely on the qualities of the young recruits engaged by the firm, and whenever possible the employer himself, a welfare supervisor, or some other responsible official of the company, should see all applicants for employment—whether they are boys or girls who apply direct, or those who have been selected by the Local Juvenile Advisory Committee as having suitable qualifications for the trade which the firm follows. No educational schemes can be successful from a firm's point of view unless parents, masters, and boys are persuaded that a firm chooses its young recruits carefully, and that the best boys and girls are put in the best places, are encouraged to go on improving them-

selves, and, so far as possible, are rewarded by promotion for the efforts they have made.

School Visits to Works.

It is particularly useful that boys and girls should be familiarized, by a system of school visits to works and offices, with prospects in local firms, and with the benefits that are likely to accrue to them from suitable education. If the benefits are reasonably assured, and can be made plain to parents and masters, the trouble involved is amply repaid in the greater interest taken in the firm. I was glad to learn from the evidence given before Mr. Malcolm's Committee that Juvenile Advisory and Employment Committees appreciate the value of these visits, and are spending a great deal of time and trouble in organizing them.

Continued Training.

I have left to the last what bulks in my mind almost as largely as the need for character, discipline, and general intelligence—that is, the arrangements for continued training after the age of 14 for the average industrial worker. I would dwell on three main points: Evening classes, day courses during the normal working hours, and apprenticeship.

With regard to evening schools, the point I wish to make is that we do not sufficiently consider the amount of time spent in them. Roughly, only one in four of those who leave elementary schools receive any continued education at all; and of these, only about one-half do anything after they are fifteen. Even this fraction—if they attend evening schools—spend effectively only 80 or 90 hours a year at classes—80 or 90 hours of tired teaching of tired pupils. Certainly many individuals have fought their way to success through evening classes; but as an institution, they have often an exaggerated importance attached to them. Useful as they are, they are only a second best.

Day instruction, sandwiched into the boys' industrial life, either as intensive courses of short duration or as part-time instruction where this better fits into the conditions of the particular industry, is to my mind far more valuable. I am very glad to see that the value of this method is becoming so widely recognized, and that so many firms are now able to encourage it by paying for time spent in this way, both by the average worker and by those pursuing more advanced courses. The instruction can be more readily assimilated because it is received when the mind and body are fresh.

Apprenticeship.

The value of apprenticeship is that, if the right teachers are chosen, it provides, or can be made to provide, just this kind of training over a definite period of years. Certainly we must not be blind to the fact that, in the heavy industries, it is often customary to take apprentices at 16 rather than straight from an elementary school; but in these cases the gap could often be filled by intensive courses such as I have already referred to, or, failing this, by evening classes combined with a temporary occupation. There was some fear, during and immediately after the war, that the days of apprenticeship were numbered. Fortunately, our institutions in England have a habit of growing with the times; and I look to an extension, rather than a contraction, of the system in the future, though probably along modified lines.

One does not wish to blow one's trumpet in these matters, but I think we in the Gas Light and Coke Company have much to be proud of in what we have done in the matter of apprenticeship. Apart from boys who are taken on at the various works as apprentices to the trade there—carpenters, engineers, bricklayers, and so forth—a number of boys are every year started on a six years' course of apprenticeship in our Sales Department. A special training centre has been provided at Watson House, which I hope some of you will have an opportunity of visiting to-morrow; and, in the apprentice shops there, special instructors are set aside for training the boys in all "the arts and practices" involved in gasfitting. The boys also spend part of each week at the Westminster Technical Institute, where, under the direction and with the kindly co-operation of the London County Council, an excellent series of technical and general educational classes has been arranged. During the course of the apprenticeship, boys are graded out, and the most suitable of them are trained for more advanced work, and many become salaried officers of the Company either as district inspectors or as showroom attendants. A study of the careers of these boys, after they have finished their apprenticeship, reveals a remarkably high level of success; and many of them continue to take higher-grade educational courses qualifying them for more important work.

Incidentally I may say that the Company have always done everything in their power to encourage in all departments, by the payment of fees and awarding of prizes, attendance at technical and general educational classes which would appear to be of benefit to the boys in their careers. In addition to the apprentices, a number of pupils of 17 or 18 years of age are, each year, started at Watson House on a more advanced five years' course of training in the work of the Gas Sales Department.

The training is given in special laboratories at Watson House and in the workshops and demonstration rooms, as well as at the Westminster Technical Institute, where they study for a Diploma given by the Institution of Gas Engineers.

Need for Close Personal Interest.

If I may sum up what I have said, I should like to feel that I have made clear my very real anxiety that the interest of industry in education should not be along narrow technical lines, but should be along the broader lines of training for general intelligence and adaptability. This policy is, I am sure, most important not only from the point of view of the nation at large, but even from that of the narrowest self-interest of individual firms. I hope I have also made it clear that I regard the generous assistance of special educational efforts by industry as a very valuable asset to our national life. Perhaps I may summarize the whole of what I have said in the one point—that I am clear that a real, close personal interest on the part of employers in the training of boys and girls who come into their works and offices, both before they come and during the early years of their industrial life, is a responsibility which they have no right to shirk, and which they would, indeed, be very unwise to shirk, because such an interest is one of the most valuable ways of promoting the real efficiency of our industry and, consequently, the general revival of our national prosperity.

SUBSEQUENT PROCEEDINGS.

A vote of thanks was accorded the President, on the motion of Mr. P. H. S. Kempton, who said Sir David had shown them that the employer has not only the right but the duty to enter into educational schemes, and that he does this with profit alike to the undertaking, the workers, and the community. Mr. Arthur Pugh (General Secretary of the Iron and Steel Trades Confederation) remarked that, in considering education in relation to industry, one is faced by the question put by the President: "What kind of education do we want?" It is necessary to be clear as to what is meant, when thinking in terms of specialized education for industrial purposes. Properly-trained men or women not only are of enhanced value in industry, but must derive greater satisfaction from the work they perform. Closer contact is needed between technical institutions and schools and the workshop, and between the former and the universities. The question of education raises issues of fundamental importance to the industrial future of the country.

Importance of "Cultural Education."

The importance of what he termed "cultural education" was urged by Mr. H. A. Roberts, M.A. (Secretary to the University of Cambridge Appointments Board). One of the most important things, he said, is to teach people to be able to enjoy their leisure—for "happy is the man who has a hobby." To have something of interest right away from their work is of the utmost importance to all. But a man must also, of course, be so equipped as to be able to enjoy his work. A friend once said to Mr. Roberts: "There is only one lasting satisfaction in life, and that is that a man's daily work should prosper at his hands."

The Employer's Duty.

The great importance of boys and girls being allowed time off for educational purposes was stressed by Mr. A. Abbott, H.M.I. (Chief of the Technical Branch of the Board of Education). He pointed out that in the old days an employer bound himself to teach his apprentice the "art, craft, and mystery" of his trade. This was done in working hours; he did not ask the apprentice to remain at work at night. It is right that the employer of to-day should perform his duty with exactly the same degree of conscientiousness as did his predecessor of years ago. It is gratifying to him to note the way in which this system of release during the day time is spreading. He has never found a local education authority unwilling to supply suitable instruction if there was a demand for it from the industries concerned.

The business session closed with a vote of thanks to the speakers, which was proposed by Mr. Percy Alden, M.A. (Treasurer of the Stapley Educational Trust).

Luncheon.

The delegates were the guests at luncheon of the Governor, Deputy-Governor, and Directors of the Gas Light and Coke Company, at the Royal Palace Hotel, Kensington. The President occupied the chair; and on his right sat the Duchess of Atholl. There were also present, among others, the Mayor of Kensington, Sir Arthur Duckham, K.C.B., Sir Richard Redmayne, K.C.B., and Mr. H. C. Honey. The toast of "The Association" was proposed by the Hon. Edward Cadogan, C.B., M.P., Chairman of the Departmental Committee appointed by the Board of Education to inquire and report as to the arrangements for the examination of students attending part-time schools, under the Regulations for Further Education, with particular reference to the place and value of examinations as an element in training for industrial, commercial, and professional activity. Of this Committee, he pointed out, Mr. Goodenough is a member. Sir Horace Wilson,

K.C.B. (Permanent Secretary, Minister of Labour), supported the toast, and made reference to the valuable work which the Association is doing. He expressed his pleasure at finding that the contact between education and industry is increasing. This contact is going to be to the benefit of industry; and it will not surprise him if it turns out to be also to the benefit of education. In acknowledgment, the President said the Association has been working steadily for a number of years. Its influence is expanding; but the goal is still a long way off. Alderman Cadbury, submitting "Our Hosts," expressed his confidence that employers are realizing the importance of education not only among their staff and their skilled workmen, but also among the rank and file. The citizens of this country, he said, must be educated, particularly at the age of adolescence; and a way must be found by which this education can be achieved. The Hon. Clive Bigham, C.M.G., C.B.E., D.L., responding, said it was a real pleasure to the Gas Light and Coke Company to act as hosts to the members of the Association. As he put it, the Company try to pay just attention to three different bodies—to their employees, their consumers, and their shareholders.

VISIT TO BECKTON.

In the afternoon, the members were conveyed by motor coach to the Beckton Gas-Works, some of the principal portions of which were inspected under the guidance of Mr. T. Hardie and members of his staff. After tea, acknowledgment was made by Alderman Cadbury, and replied to by Mr. Hardie, in the unavoidable absence of the President. Mr. Hardie said the staff are proud of the works, and very rightly so. ["Hear, hear."]

THE GAP BETWEEN 14 AND 16.

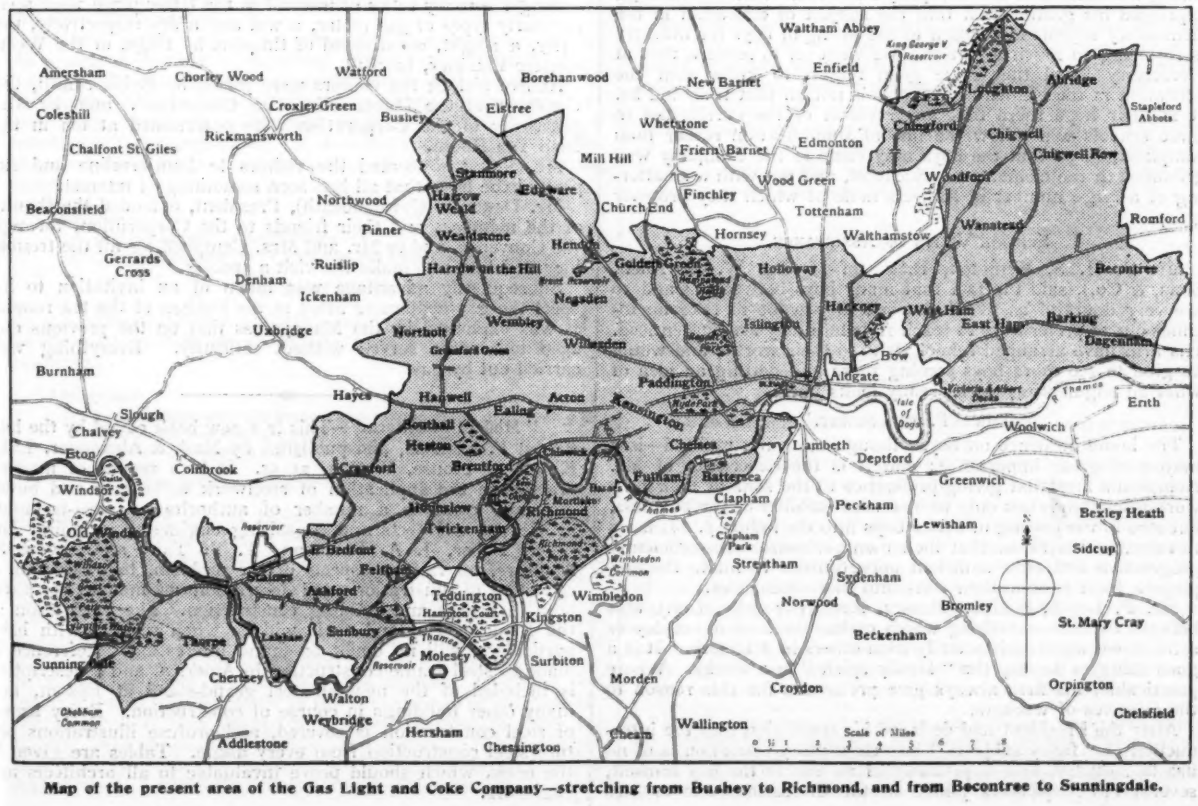
Thursday morning's session was devoted to a further discussion of the subject of the recruitment and training of the young employee in industry and commerce, in the course of which divergent views were expressed. Sir Max J. Bonn, K.B.E.—the first speaker—is Chairman of the London Advisory Council for Juvenile Employment, who deal with many thousands of cases yearly, and represent, he said, to-day the only large organized effort to get in contact with youths between 14 and 16 years of age, who otherwise are without contact with anybody. But things do not progress as could be wished; and he feels that the only thing which can really help to secure efficient organized contact with the juveniles is public opinion, and this up to now it has been impossible to arouse. Thus there is still the gap between 14 and 16; and in this connection he recommended to the consideration of the Association what is known as the "working certificate."

NEED FOR CO-OPERATION.

Sir George H. Hume, J.P., M.P., speaking with the knowledge of the subject gained by him while Chairman of the London County Council, put in a strong plea for co-operation between education authorities and local industries, and gave some details of what has been accomplished in London. The principal ways in which this co-operation can be effected are, according to him: (1) By affording facilities for employees to attend day or evening classes. (2) By systematically absorbing into employment young persons trained by the local education authority for the various industries, and by otherwise recognizing the part-time training provided by the education authority for their employees. (3) By co-operating with the local education authority in the formation of advisory bodies to direct technical education and ensure that it is of the kind best adapted to the needs of the district. (4) By financial support. In London employers are realizing more and more what can be achieved by the schools; but a large proportion are still indifferent. Setting out briefly what is done in various branches of industry, Sir George stated that the Gas Light and Coke Company select a number of lads for training each six months. The workshop training is provided in the Company's own shops; but for technical training, calculations, elementary science, &c., they attend the Westminster Technical Institute for four or five afternoon or evening sessions a week in the first period of training, and one whole day and one or two sessions a week in the second period. Over 130 are in attendance. The Company require a record to be kept at the Technical Institute of the progress made by their employees in the various subjects of instruction; and advancement in their employment to some extent depends upon this report. He paid great tribute to the work the Company have done in this matter; and he assured the Association that the London County Council are wide awake regarding that extraordinarily difficult period from 14 to 16 years of age.

EDUCATION AND INDUSTRY TWO ASPECTS OF THE SAME THING.

"If this question is to be looked at at all, it must be looked at as a whole; education and industry are not two things, but are merely two aspects of the same thing," declared Mr. F. Mander, B.Sc. (President of the National Union of Teachers). What happens in industry must be profoundly influenced by what happens to children before they enter industry; and no industrialist, he went on, has a right to claim that education should fulfil its obligations to industry, unless he is prepared to admit that industry must fulfil its obligations to education. He foresees the inevitability of the extension of school life to 15, and regards the question of the working certificate as extremely difficult, and as needing further careful consideration before a final decision can be arrived at. Another point raised by Mr. Mander was that at the age of 14 there are very few boys who really know what kind of work they will like to take up. Most boys want to enter a particular branch of industry; not as it is, but as they imagine it to be. Therefore any measure which can be taken to increase the knowledge of boys of actual conditions in industry will be one of the most useful things that can be undertaken. Visits to works are difficult to arrange; but he thinks that something might be done by the provision of reading matter. Still more can be accomplished, in Mr. Mander's



Map of the present area of the Gas Light and Coke Company—stretching from Bushey to Richmond, and from Becontree to Sunningdale.

view, by increasing the interest of teachers in industry. There must be closer contact between the teaching profession and those who carry on industry.

How Industry Can Help.

A suggestion came from Alderman George Cadbury, who remarked that what the Association are seeking to do is to find out how the industrial community can help. A good deal had been said about the gap between 14 and 16; but education does not cease at 16, and therefore it is necessary to take a longer view. A boy ought not to be asked to select his career before reaching the age of 16. It is not desirable that the elementary school should attempt to take technical subjects in any way; what is wished is that the boy or girl shall come from there well grounded in elementary subjects. Let the man who has a first-hand knowledge of industry enter schools, and talk to the children about the problems which will arise when they go into industry. Employers should be asked to provide men who can do this. In this way there would be much closer contact between industry and education. What is needed is to make education a better introduction to industrial life than it has been in the past.

Mr. Goodenough's Statement.

The next speaker was Mr. F. W. Goodenough, C.B.E. (Executive Chairman of the British Commercial Gas Association, and Chairman of the Education Committee of the Institution of Gas Engineers), who said that, bearing in mind that the President of the Association was the Governor of the Gas Light and Coke Company, it was easy to realize that in this Company there are no difficulties whatever in the way of suitable education, but every encouragement from the employers' side. Speaking as one who has been connected for a good many years, under the direction of the President, with the scheme of apprenticeship for the foundation of which Sir David Milne-Watson was responsible some sixteen years ago, he declared that apprenticeship schemes, if properly organized and conducted, are of very great value in dealing with juveniles coming from the elementary schools—particularly if such schemes are not merely directed to training the boys for their trade, but concern themselves also with general education from the time they leave school right through their apprenticeship. This, as they had gathered from the President's address, is the case with the Gas Light and Coke Company's scheme; and with such provision in an apprenticeship scheme, Mr. Goodenough would rather have the boys at 14—or at any rate not beyond 15—and continue their education from this point. But, of course, this pre-supposes that one has an employer who will pay close attention to the collateral education, and that the local education authority will co-operate in so doing. In this connection, he paid a warm tribute to the London County Council teachers at the Westminster Technical Institute for the great interest and the enormous amount of care which they take in the general education of the Company's boys. The high quality of the instruction there has proved of the utmost value in assuring the success of the Company's scheme. Mr. Goodenough expressed his gratification that the subject of education in the elementary schools in relation to the fitting of boys for industry is receiving so much attention, and went on to remark that at Horseferry Road they have good reason to know that the education in the elementary schools is not all that it should be. It is their hope there that any revision of the curriculum in these schools will follow the line of simplification rather than complication, so that the boys may come to the Company well grounded in the elements of education, and not with a smattering of a large number of subjects none of which they properly grasp.

School Visits of Assistance.

Mr. P. H. S. Kempton, B.Sc. (of Messrs. W. H. Allen, Sons, & Co.), said the fact that many boys between 14 and 16 are very doubtful as to what work they want to take up inclines one to prefer boys to reach 16 before they are apprenticed. His firm have arranged school visits to their works, and would be glad to see more boys coming there and getting an idea of what an engineering works really looks like.

The "Family Spirit."

The home influence on boys—though often not realized—is a matter of great importance; and it is the experience of Mr. Kempton's firm that giving preference to the sons of their own workpeople tends not only to increased stability of the business, but also to the getting of better boys into the industry. It is up to industrialists to see that their own businesses are sufficiently progressive and offer sufficient opportunities to make the employees want to send their sons into these industries.

Mr. P. Leech, B.Mus. (Messrs. Reckitt & Sons, Ltd.), also believes there is something which makes the sons of employees settle down more satisfactorily than others in a factory. It is a good thing to develop the "family spirit" in a works. Where practicable, his firm always give preference for this reason to the relatives of workers.

After the President had declared his conviction that the introduction of "fancy subjects" into elementary education is of no use to industry, and is probably of no use to the boy himself, several other speakers joined in the discussion—one or two expressing disagreement with what had been said as to the introduction of sons of employees.

On the motion of Mr. P. R. Rooksby, a hearty vote of thanks was passed to the President and the Gas Light and Coke Company for the hearty welcome and great hospitality that had been extended to the Association.

The President said it had been a great pleasure to him and to his Company to act as the hosts of the Association on this occasion. They had taken for a very long time a great interest in educational matters in connection with their own business, and therefore those interested in the matter. What all are after really is character building—making boys efficient men, and therefore efficient workmen. This is a great ideal; and there may be more than one way of achieving it.

Horseferry Road and Watson House.

The afternoon was devoted to an inspection first of all of the Gas Light and Coke Company's beautiful Horseferry Road showrooms (over which the members were conducted by Mr. F. W. Goodenough, Mr. Stephen Lacey, and other members of the staff), then to the highly organized special service section of the Gas Sales Department, and finally to Watson House, where closer acquaintance was made with the Company's education scheme. At Watson House tea was served, and Alderman Cadbury's thanks on behalf of the Association were acknowledged by Mr. Lacey.

In the evening Sir David and Lady Milne-Watson held a reception at the Empress Rooms, Royal Palace Hotel, Kensington. This terminated in a delightful manner a conference which, it was generally felt, had been eminently successful.

SCOTTISH JUNIOR GAS ASSOCIATION.

(EASTERN DISTRICT.)

A thoroughly successful session was brought to a close on Saturday, June 25, when the annual excursion to Dunfermline took place. In the forenoon the members visited the gas-works, where they were met by Mr. J. Campbell, the Engineer and Manager; while their lady friends, under the leadership of Mrs. Campbell, were conducted over the linen and embroidery sections of the St. Margaret's Works of Messrs. Hay & Robertson.

At the gas-works, the recent installation of two beds of Woodall-Duckham retorts, added since the Association last visited Dunfermline, and the tar plant described by Mr. Geo. E. H. Keillor in his prize-winning paper read to the Association during the session (see "Journal" for May 18, p. 435), were the principal items of interest.

At one o'clock the members had luncheon at the Bruce Restaurant. Afterwards, it was impossible to hold the golf competition, on account of the inclement weather, heavy rain falling at this time; but a tour of inspection of the Abbey, Palace Ruins, Pittencrieff Glen, and the Museum took place. Among the many relics of interest in the latter place were seen two early types of gas meter, a wet and a dry respectively, the latter, a 1-light, constructed of tin-plate by Edge, of the Westminster Foundry, in 1848.

At five o'clock the visitors were joined by Bailie Smith, the Convener of the Dunfermline Gas Committee, and by the generosity of the Corporation were entertained at tea in the Glen Tea Room.

Mr. Smith welcomed the visitors to Dunfermline and expressed the hope that all had seen something of interest.

Mr. Darling (Cowdenbeath), President, extended the thanks of the members and their friends to the Corporation, through the Convener, and to Mr. and Mrs. Campbell for all the trouble they had taken to make the visit a success.

Subsequently advantage was taken of an invitation to inspect the gas appliances fitted in the kitchen of the tea rooms. It was explained by the Manageress that on the previous day 2500 teas were served without difficulty. Everything was carried out by gas.

"Modern Steelwork."—This is a new book edited by the late Ernest F. Etchells, and published by Nash & Alexander, Ltd., Kingsway House, W.C. 2, at 5s. It is a review of modern practice in the application of steelwork to bridges and building, and contains a number of authoritative semi-technical articles by architects and consulting engineers, including Dr. Oscar Faber, J. A. Sharman, T. S. Tair, and Ewart S. Andrews, on various aspects of the problem, together with a collection of illustrations and descriptions of modern contracts both in bridge and building construction. The illustration of the Bank of England as it will be when rebuilt, with brief particulars, will no doubt be found interesting. Reference is made to steel frame construction in America, and a description is included of the new all-steel grand-stand at Epsom, and many other buildings in course of construction. Every aspect of steel construction is covered, and profuse illustrations picture steel construction from every angle. Tables are given in the book, which should prove invaluable to all architects and engineers.

ANALYSIS OF EFFLUENT LIQUORS.

Extracted from the Chief Alkali Inspector's Report.

When noticing in the "JOURNAL" for June 29 the report for 1926 made by Dr. T. Lewis Bailey (Chief Inspector for England and Wales) under the Alkali, &c., Works Regulation Act, 1906, allusion was made to certain valuable results of investigations which have been carried out. Portions which will be of particular interest to our readers at the present juncture are reproduced below.

ESTIMATION OF HIGHER TAR ACIDS IN EFFLUENT SPENT LIQUORS.

The prejudicial effect of what may be termed the higher tar acids on the character of effluent spent liquors has been the subject of special investigation in the laboratory and elsewhere during the past few years. The presence of these objectionable compounds is especially noticeable in the liquors obtained from certain sections of the condensing plant on vertical retort systems; and the effluent spent liquor from ammonia stills dealing with such condensates invariably develops a deep brown colour on exposure to air. This discoloration of the liquor is accompanied by the absorption of a considerable amount of oxygen; and it is by no means surprising, therefore, that strong objection is taken to the discharge of such polluted liquor into the sewers and watercourses, quite apart from the presence of other constituents equally objectionable from the point of view of their effect on the permanganate test of oxygen absorbed.

An attempt was made in 1923 to obtain a rough measure of the amount of polyhydric tar acids and other colouring bodies in ammoniacal liquors by means of a colorimetric test based on the depth of colour that obtains when the liquor (freed, if necessary, from sulphide and cyanide by boiling) is rendered strongly alkaline with ammonia and shaken with air. Prolonged experience of the method indicates that the colour tint developed is by no means of uniform character. Indeed the results are often rendered so uncertain by the difficulty of matching the standard tint as to minimize the value of any conclusions based on the colour index figures. On account of its unsatisfactory character, we have recently made an attempt to replace the colorimetric test, above referred to, by a quantitative test based on the oxygen-absorbing properties of the liquor when shaken with air. Experiment shows that when a given volume of a solution containing a dihydric phenol, such as catechol ($C_6H_4(OH)_2$), is rendered strongly alkaline with caustic soda and shaken in the cold with excess of air, a rapid absorption of oxygen takes place, and that the volume of oxygen thus absorbed is definitely related to the weight of catechol present.

On the other hand, no noticeable absorption of oxygen takes place when the catechol is replaced in the experiment by a solution of phenol, cresol, pyridine, sodium thiosulphate, or ammonium thiocyanate.

Effluent spent liquors, not previously exposed to air, behave in a similar manner to catechol. After exposure to air for a period sufficient to ensure complete aeration of the higher tar acids, the effluent absorbs no oxygen when shaken with air under the conditions of the test, though, of course, it is still reactive to permanganate. A determination of this aeration constant of a liquor is conveniently effected in the following manner:

Solutions—

(1) 10 p.ct. solution of caustic soda.
(2) Catechol solution (*a*) 11 grammes per litre; 1 c.c. = 0·011 gramme $C_6H_4(OH)_2$.
" " (*b*) 10 c.c. of solution (*a*) diluted to 100 c.c.

It should be noted that a dilute solution of catechol is not very stable, and solution (*b*) should therefore be made up fresh as required.

Apparatus—

(1) Bunte burette with the graduations carried down 10 c.c. below the zero point, and allowing about 7 c.c. free space above the lower stopcock. Capacity of tubulus below stopcock 1 c.c. Total capacity, 118 c.c.
(2) Deep glass cylinder, filled with water at about air temperature.

Procedure.—19 c.c. of catechol solution (*b*) are drawn into the burette through the lower tubulus (leaving the tubulus charged with 1 c.c. of solution)—20 c.c. in all. The burette is then placed with its tubulus in a small cup containing about 10 c.c. of the soda solution, and suction is again applied to the burette until the upper level of the liquor stands at approximately the + 9 c.c. mark. The burette is now placed in the water cylinder with the upper stopcock open. As soon as temperature conditions are constant the stopcock is closed and about 1 c.c. of distilled water is run into the cup of the burette; the stopcock is now opened and water allowed to enter the burette until pressure conditions are constant. The air in the burette is thus measured under a slight excess pressure, equivalent to about 2 mm. of mercury—a negligible amount.

The burette now contains approximately 91 c.c. of air, 20 c.c. of catechol solution, and 6 c.c. of soda solution—117 c.c. in all.

The contents of the burette are shaken for 5 mins., the burette is returned to the water cylinder, and pressure conditions are adjusted as before by the admission of water. The shaking is repeated for a further 5 minutes, and readjustment of pressure conditions again established. If the volume of water then required to restore the pressure does not exceed 0·2 to 0·3 c.c., the absorption is taken to be complete; otherwise the shaking is continued for a further period. The brown alkaline liquid is then displaced by water in the usual way, and the residual volume of gas is read off at approximately the same temperature and pressure as before. Then—

Oxygen absorbed, grammes per 100,000 c.c. of catechol solution (one gramme molecule) = c.c. of O absorbed (0° C. 760 mm.) × 5 × 1·43.

The following example is cited by way of illustration:

	Bar. Pressure 775 mm. Temp. 9° C.
First 5 mins.	4·20
Second "	2·75
Third "	1·00
Fourth "	trace = 7·95 c.c.

Whence,
Oxygen absorbed, grammes per gramme-molecule of catechol = 7·95 × 0·976 × 5 × 1·43 = 55·5.

A similar experiment carried out at 20° C. gave 55·8 grammes of O per gramme-molecule of catechol.

An experiment made with 20 c.c. of a solution containing 0·5 gramme of pyridine, 0·2 gramme of phenol, 0·5 gramme of cresol, and 0·110 gramme of catechol per 100 c.c. gave 8·1 c.c. of oxygen absorbed in 15 mins., at 9° C. and 775 mm., corresponding to:

8·1 × 0·976 × 5 × 1·43 = 56·5 grammes of O per gramme-molecule of catechol.

It is of interest to compare the weight of oxygen absorbed under these conditions with the oxygen theoretically required for complete oxidation of the catechol to carbon dioxide and water, and with that absorbed in the permanganate test at 27° C.

	Weight of Oxygen per Gramme-Molecule of Catechol.
Absorbed from air at 15° C.	55 grammes
Permanganate test—	
3 mins. at 27° C.	107 "
4 hrs. "	137 "
Theoretical for complete oxidation	208 "

We thus see that the weight of oxygen absorbed by one gramme-molecule of catechol in the 4 hours' test with permanganate at 27° C. is 2·5 times that absorbed from air at 15° C. in the burette.

Applying the same procedure to various samples of effluent spent liquor from vertical and horizontal retort systems, it was found that the absorption of oxygen was generally complete within 10 mins. with horizontal retort liquors. With liquors from vertical retort systems absorption was somewhat slower; and it was found advisable in some cases to reduce the volume of liquor taken for analysis, in order that the excess of oxygen in the burette might not be unduly reduced. The following example is cited by way of illustration:

	Vol. of Oxygen Absorbed by 15 C.C. of Liquor—Vertical Retorts.
In 10 mins.	10·9 c.c.
Third 5 mins.	1·0 "
Fourth "	0·3 "
Fifth "	0·2 " = 12·4 c.c.

Whence,
Oxygen absorbed, grammes per 100,000 c.c. of liquor

$$= 12{\cdot}4 \times 0{\cdot}945 \times \frac{100}{15} \times 1{\cdot}43 = 112.$$

This amount is equivalent to $\frac{112 \times 110}{55} = 224$ parts of catechol.

It is of interest to compare the relationship thus established by the burette aeration test with that obtained by the earlier colorimetric test. Stated in terms of catechol,* the figures thus obtained in each case show the amount of catechol ($C_6H_4(OH)_2$) that would be needed per 100,000 parts of liquor to produce the particular effect noted—viz., in the colorimetric test the depth of tint, and in the burette aeration test the weight of oxygen absorbed when the liquor is rendered alkaline and shaken with excess of air. The results should be the same if the only colour-producing body were catechol. As other polyhydric tar acids than catechol are present, neither test can be regarded as having an absolute value. All that can be claimed for either of

* NOTE.—According to S. P. Burke and S. Caplan, in a recent paper to the American Chemical Society, the material in low-temperature tars which is responsible for the red colour of aqueous extracts of such tars has been shown to be a mixture of ortho-dihydric phenols, including homologues of catechol, but not catechol itself. ("Chem. Trade Journ.," Jan. 28.)

the methods is that it enables one to effect useful classification and comparison of effluent liquors.

In the following table are presented the catechol equivalent figures for various effluent spent liquors collected fresh from the settling pits.

Higher Tar Acids and Colour-Producing Bodies, in Terms of Catechol, per 100,000 Parts of Liquor.

Liquor.	Colorimetric Test. (a).	Burette Aeration Test. (b).	Relationship Calculated (Works A = 1).	
			Tests (a).	Tests (b).
Horizontal retorts—				
Works A.	35	19	1	1
Works B.	45	16	1·3	0·9
Works C.	70	27	2·0	1·4
Vertical retorts—				
Works D.	165	60	4·7	3·2
Works E.	350	115	7·0	6·0
Works F.	550	224	15·7	11·8

It will be seen from the table that the index figures stated in terms of catechol given by method (*a*) are in general rather more than double those given by method (*b*), but that the interrelationship of the figures among themselves is of the same order in both cases. The rough classification of liquors effected by the two methods of analysis is thus approximately the same. Undoubtedly, effluent spent liquors from vertical retort working are markedly richer in higher tar acids and other colour-producing bodies than those from horizontal retort working.

The burette aeration test is regarded as being much the more reliable, since the index figures thus obtained are based on data that possess the advantage of being independent of the uncertainty attaching to figures based on colorimetric determinations, where tints are often difficult to match.

It is of interest to compare the results obtained by the burette method with those yielded by the permanganate test for oxygen absorbed. It has already been explained that the "difference figure" in the analysis is the figure obtained by subtracting from the total figure for oxygen absorbed in the 4 hours' test with permanganate at 27° C. the sum of the weights of oxygen theoretically required to oxidize the phenol, thiocyanate, and thiosulphate under the conditions of the test. Contributory factors to the sum total of the "difference figure" will be organic bases, such as pyridine, the polyhydric phenols, and other colour-producing bodies, such as catechol and pyrogallol. On the other hand, as already stated, there is reason to believe that in the burette aeration test the absorption of oxygen is due in great measure, if not entirely, to partial oxidation of the higher tar acids, since phenol, cresol, pyridine, thiosulphate, and thiocyanate are without action on oxygen under the conditions of the test. A comparison of the weights of oxygen absorbed in the burette aeration and the permanganate tests should therefore enable us to determine how far the higher tar acids are contributory factors to the "difference figure" in the case of any given liquor.

Data are lacking for a complete discussion of the question, but the following results may be cited by way of illustration:

Analysis of Effluent Spent Liquors.

Liquor.	Weight of Oxygen Absorbed—Parts per 100,000.	
	Burette Aeration Test (Due to Higher Tar Acids Only) 15° C.	Difference Figure in the Permanganate Test 4 Hours at 27° C.
Horizontal Retorts—		
Works A	½	..
Works B	8	85
Works C	13	..
Vertical Retorts—		
Works D	30	200
Works F	112	415
Catechol (pure) one gramme-molecule	55	137

Thus, when catechol alone is present, the amount of oxygen absorbed in the 4 hours' permanganate test at 27° C. (137 parts) is 2½ times that absorbed in the burette aeration test at 15° C.

In the case of Works F, if we assume that catechol alone is present, and multiply the figure 112 (for the burette test) by 2½, we obtain the figure 280 for the amount of oxygen that would be theoretically absorbed in the permanganate test; the actual figure so obtained was 415. We are justified in concluding, therefore, from these figures that something like 70 p.ct. of the impurities represented by the difference figure, 415, in the analysis is due to higher tar acids.

Estimation of "Phenol" in Ammoniacal Liquors and in Effluent Spent Liquor.

The method employed for the estimation of phenol is that known as Titherley's method. To convert the figure thus obtained into the equivalent figure for oxygen absorbed, parts per 100,000 (4 hours' test at 27° C.), Frankland and Silvester's constant is employed. Thus:

1 gramme of phenol absorbs 1·78 grammes of oxygen.

The corresponding constant, calculated from the results of the analysis of five samples of phenol-containing distillate in this laboratory, was 1·77.

Skirrow's constant for a 3-min. test at 23° C. was 1·401. The corresponding constant calculated from the results of the analysis of eight samples of phenol-containing distillate in this laboratory in a 3-min. test at 27° C. was 1·47.

The 3-min. test is a most convenient one, but somewhat difficult to apply; and the results obtained by this method are of approximate value only. Not only are the conditions of analysis difficult to maintain within the prescribed limits, but the phenol distillate itself is by no means a pure product when effluent spent liquors are the source of the phenol, even though organic bases are expelled by preliminary evaporation of the crude liquor with caustic soda in the manner prescribed by Skirrow. Nevertheless, as an alternative method to the direct estimation of the recovered phenol by titration with N/10 iodine in presence of caustic soda, the indirect method, based on a 3-min. test with permanganate at 27° C., has much to recommend it.

Effect of NH_3 Content of Ammoniacal Liquor on Volatilization of Phenol.

Le Roy W. Heffner and Tiddy (U.S.A. Pat. 1,595,602 and 1,595,603, both of Aug. 10, 1926) state that if an ammoniacal liquor containing phenol be maintained at a suitable temperature—*e.g.*, between 98° and 100° C., or higher—the phenol tends to be combined and driven off with the ammonia. In the case of gas liquor unusually rich in ammonia, the ammonia content of the liquor, according to the authors, may itself be sufficient to drive off the phenol. If the ammonia content is low, they provide additional ammonia prior to distillation.

The point is one of considerable interest in relation to the treatment of effluent spent liquor from the ammonia still, as a large proportion of the phenol—in some cases up to 40 p.ct.—in the ammoniacal liquor distilled is volatilized with the ammonia and condenses with the devil liquor; and separation of the devil liquor from the general body of spent liquor, and its separate treatment by evaporation in waste-heat flues, have been proposed as a ready means of freeing the effluent spent liquor from a substantial proportion of what may be termed its most noxious constituent. Laboratory experiments were therefore undertaken to determine the effect on the volatilization rate of phenol of increasing the ammonia content of a given liquor from *nil* to 6 p.ct. The experiments, of course, were on a laboratory scale, and the conclusions drawn may not be applicable to results obtained under other conditions and with large-scale plant.

In the experiments 250 c.c. of the ammonia-phenol mixture were directly distilled in a round-bottomed flask, connected through a catch bulb to a Liebig condenser and receiver, at the rate of 100 c.c. per 15 min.—150 c.c. in all. The residual liquor in the flask was cooled and diluted to 250 c.c., and the phenol determined in an aliquot portion by titration with N/10 iodine.

The amount of residual phenol thus determined, subtracted from the amount of phenol taken for distillation, gave the figure for phenol volatilized. The results were as follows:

250 C.C. of Solution Distilled Contained per 100 C.C.		Phenol Volatilized, P.Ct. of Total Taken.
Phenol, Grammes.	Ammonia, Grammes.	
0·200	*Nil*	82
,,	1	78
,,	2	78
,,	2·5	77
,,	3	76
,,	6	78

It will be seen from these figures that, under laboratory conditions, increasing the proportion of ammonia in the liquor has little, if any, effect on the volatilization rate of phenol. The maximum amount of phenol condensed was obtained in absence of ammonia. Indeed, one would expect that ammonium phenate would be less volatile than the acid itself—ammonium carbonate is less volatile than either of its constituents.

The Parker Producer Gas Plant.—Last week we saw an interesting demonstration of a producer plant operating a "Peterbro'" tractor. The plant, which is manufactured by the Parker Producer Gas Plant Company, 170-173, Piccadilly, W. 1, consumes charcoal; and the firm point out that, provided timber is available—as it is in the Dominions and Dependencies, and other countries for which the producer-gas driven tractor is designed—it is possible to have all the advantages of mechanical traction for farm and other work at a fraction of the cost of similar power from oil fuels. The demonstration was most convincing.

INSTITUTION OF GAS ENGINEERS' EDUCATION SCHEME.

List of Successful External Candidates in the 1927 Examinations.

We have received for publication from Mr. Walter Hole (the Organizing Secretary) the following list of the successful candidates (external) for the Institution's certificates in the recent examinations in Gas Engineering and Gas Supply held under the Education Scheme of the Institution of Gas Engineers. The names of the successful internal candidates will be published as soon as the results of their examinations in ancillary subjects have been confirmed by the Board of Education.

GAS ENGINEERING.

ORDINARY GRADE.

Name.	Class.	Ancillary Subjects Taken.
Brown, Kenneth Edwin Benson	1st	Maths., Mechanics, Heat Engines.
Cooper, James Edward	1st	Maths., Mechanics, Heat Engines, Inorganic Chemistry.
Eliot, Alan William	1st	Maths., Engineering Science, Machine Drawing.
Fairbank, William	1st	Maths., Machine Drawing, Heat Engines.
Ross, Louis Alfred	1st	Maths., Machine Drawing, Heat Engines.
Snowden, Kenneth	1st	Maths., Physics, Inorganic Chemistry, Organic Chemistry.
Bichard, Cecil Thomas	2nd	Maths., Physics, Chemistry.
Birch, Donald	2nd	Mechanics, Heat Engines, Inorganic Chemistry, Organic Chemistry.
Brook, Joseph Cyril	2nd	Maths., Mechanics, Machine Construction.
Carpenter, Philip Turner	2nd	Maths., Machine Drawing, Inorganic Chemistry, Organic Chemistry.
Cornish, Kenneth Charles	2nd	Maths., Physics, Inorganic Chemistry, Organic Chemistry.
Corris, Ernest	2nd	Maths., Physics, Mechanics.
Gilbert, Frederick George	2nd	Maths., Physics, Inorganic Chemistry, Organic Chemistry.
Hopkinson, Stanley	2nd	Maths., Physics, Inorganic Chemistry, Organic Chemistry.
Johnson, Charles	2nd	Maths., Physics, Inorganic Chemistry.
Jones, Stanley	2nd	Maths., Physics, Inorganic Chemistry, Organic Chemistry.
Lally, Richard	2nd	Maths., Machine Drawing, Physics.
Leaver, William Alfred	2nd	Structural Engineering, Mechanical Engineering, Machine Drawing, Building Construction.
Lowe, Frank	2nd	Maths., Chemistry, Physics.
Monson, Gilbert East	2nd	Maths., Physics, Inorganic Chemistry, Organic Chemistry.
Petersen, Charles Fuller	2nd	Maths., Physics, Inorganic Chemistry.
Randell, John Martin	2nd	Maths., Physics, Building Construction.
Robertson, Thomas Liddle	2nd	Maths., Machine Drawing, Mechanics, Heat Engines.
Robson, Colin	2nd	Maths., Physics, Inorganic Chemistry.
Soanes, Frederick Robert William	2nd	Maths., Physics, Inorganic Chemistry, Mechanics.
Staniforth, Claude Bertram	2nd	Inorganic Chemistry, Organic Chemistry, Physics.
Stewart, William Charles	2nd	Maths., Physics, Inorganic Chemistry, Organic Chemistry.
Taylor, Charles Edward	2nd	Inorganic Chemistry, Organic Chemistry, Machine Drawing.
Thomson, James Lindsay	2nd	Maths., Physics, Inorganic Chemistry, Organic Chemistry.
Walker, Frank	2nd	Machine Drawing, Heat Engines, Inorganic Chemistry.
Whitehead, Thomas Proctor	2nd	Maths., Inorganic Chemistry, Organic Chemistry.
Wilson, Frederick	2nd	Maths., Physics, Mechanics.

HIGHER GRADE.

Name.	Class.	Ancillary Subjects Taken.
Douglas, Robert	1st W.D*	Maths., Physics, Chemistry, Machine Drawing, Mechanics, Heat Engines.
Johnston, Harry	1st W.D*	Inorganic Chemistry, Organic Chemistry, Physics, Mechanical Engineering.
Crowther, Ruben	1st	Maths., Inorganic Chemistry, Organic Chemistry, Machine Drawing, Mechanics, Heat Engines, Building Construction.

HIGHER GRADE (*continued*).

Name.	Class.	Ancillary Subjects Taken.
Greaves, Ralph Lincoln	1st	Maths., Inorganic Chemistry, Organic Chemistry, Physics, Engineering Science.
Harrison, Louis William	1st	Maths., Machine Drawing, Mechanics, Heat Engines.
Haworth, Thomas	1st	Maths., Inorganic Chemistry, Organic Chemistry, Physics.
Kleist, Leslie Leonard	1st	Maths., Chemistry, Physics, Engineering Science, Engineering Drawing.
McDonald, Alexander	1st	Inorganic Chemistry, Organic Chemistry, Physics, Engineering Drawing, Descriptive Engineering.
Monroe, Colin Ronald	1st	Engineering Chemistry, Mechanics, Physics, Hydraulics, Thermo Dynamics.
Stoddart, Charles Easton	1st	Maths., Inorganic Chemistry, Organic Chemistry, Physics, Mechanics and Heat Engines, Building Construction and Constructional Engineering.
Williams, John Harold	1st	Maths., Inorganic Chemistry, Organic Chemistry, Physics.
Baker, Eric Edward	2nd	Heat Engines, Machine Drawing, Materials and Structures.
Boyd, John	2nd	B.Sc. in Chemistry with Physics, Machine Drawing, Heat Engines.
Caesar, John Ernest Victor	2nd	Maths., Inorganic Chemistry, Organic Chemistry, Physics.
Duncan, Thomas Moncur	2nd	Maths., Inorganic Chemistry, Organic Chemistry, Physics, Mechanics, Machine Drawing, Building Construction.
Roberts, John	2nd	Maths., Mechanics, Building Construction, Heat Engines.
Sansom, Frederick William	2nd	Inorganic Chemistry, Organic Chemistry, Physics, Physical Chemistry.
Storey, William	2nd	Organic Chemistry, Chemistry of Gas Manufacture, Engineering Science.
Williams, Rowland Joseph	2nd	Maths., Chemistry, Physics, Mechanics and Heat Engines.
Wood, James Frederick Louis	2nd	B.Sc. in Chemistry, General Engineering, Metallurgy.

*W.D. = With distinction.

GAS SUPPLY.

ORDINARY GRADE.

Name.	Class.	Ancillary Subjects Taken.
Pallister, John William	1st W.D.*	Maths., Machine Drawing, Mechanics, Heat Engines.
Jack, Harold	1st	Maths., Mechanics, Heat Engines.
Kendrick, Harold Bunce	1st	Maths., Mechanics, Machine Drawing, Heat Engines.
Kimmins, Lionel George	1st	Maths., Physics, Mechanics, Heat Engines.
Kirkhope, John	1st	Mechanics, Physics, Machine Drawing.
Morton, Robert	1st	Inorganic Chemistry, Physics, Machine Drawing.
Owen, John Richard	1st	Mechanics, Physics, Heat Engines.
Sheehan, Patrick Joseph	1st	Maths., Mechanics, Machine Drawing, Heat Engines.
Sullivan, Harold Denis	1st	Maths., Machine Drawing, Mechanics, Heat Engines.
Clapham, Thomas William	2nd	Maths., Mechanics, Machine Drawing, Heat Engines.
Greig, Harold	2nd	Maths., Mechanics, Machine Drawing.
Huntley, Thomas	2nd	Theory and Applied Mechanics, Physics, Engineering Drawing.
Jarmin, Clifford Stephen	2nd	Maths., Mechanics, Machine Drawing, Heat Engines.
Tattersall, James Arthur	2nd	Maths., Physics, Inorganic Chemistry, Organic Chemistry.

*W.D. = With distinction.

HIGHER GRADE.

Name.	Class.	Ancillary Subjects Taken.
Atkin, Frederick Lawrence	1st	Chemistry, Applied Mechanics, Physics, Heat Engines.
Denton, John Willie	1st	Higher National Certificate Mechanical Engineering.
Poulter, Lionel Charles Stephen	1st	Maths., Gas Laboratory Practice, Technical Chemistry.

Vickers, Ltd.—We are informed by Messrs. Vickers, Ltd., that Mr. F. Dudley Docker, C.B., the Rt. Hon. R. McKenna, and Sir William Plender, Bart., G.B.E., have notified the Board that in their opinion the time has arrived when they can properly relinquish their position as Advisers to the Board, which position they were invited to occupy at the request of the Board and with the approval of the shareholders, at the time of the reconstruction of the Company. In accepting their resignation, the Board have taken the opportunity of acknowledging, on their own behalf and that of the shareholders whom they represent, their sincere appreciation of the great services which they have rendered to the Company in an honorary capacity. Mr. George R. T. Taylor has been appointed Deputy-Chairman of the Company.

HEAT ENGINE TRIALS.

Tabulating the Results.

The Joint Committee appointed through the action of the Institution of Civil Engineers to revise and extend the report on steam engine and boiler trials published in 1913 by a previous Committee submitted their report for discussion at a meeting held at the Institution of Civil Engineers on June 10.

Mr. W. H. Patchell, who presided, explained that, subsequent to a discussion in 1922, at the Institution of Naval Architects, the late Captain H. Riall Sankey proposed to the Council of the Institution of Civil Engineers that the time had arrived for a revision of the 1913 code, and that it was advisable to extend the scope of the inquiry to include all heat engines. The Council thereupon appointed a small Committee, and invited other institutions and bodies to collaborate. Among the latter was the Institution of Gas Engineers.

Thus a Committee entitled the Committee on Heat Engine and Boiler Trials, subsequently renamed the Heat Engine Trials Committee, had been formed in 1922; and since that time they had prepared codes. Meetings had been held from time to time [accounts of these meetings have been published in the "Journal"] when useful criticism of the draft codes had been made. The Committee had found it convenient to appoint two Sub-Committees dealing respectively with steam and internal combustion engines; and detail work had in each case been carried out by three subsidiary Panels. They had also appointed four Sub-Committees and one Panel to deal with special matters common to all the work, and with compressors and blowers.

Having referred to the enthusiasm and ability of Captain Sankey, whose death was a professional loss to the whole world, Mr. Patchell suggested that it would be a good idea if the Institution of Civil Engineers would establish a permanent committee to maintain the codes up to date. Such a committee could keep in touch with other countries, particularly with the American Institute of Mechanical Engineers, which employed codes different from those in this country; and this work might result in a universal system. The main object of the Committee in setting-up the comprehensive codes had been to prevent ambiguity in terms and in statements of results. He paid tribute to the work of Prof. W. E. Dalby in rendering the first part of the report—that on boilers and steam engines—concise, and to that of Prof. C. J. Hawkes in clarifying the second part of the report, which dealt with gas producers and internal combustion engines.

Following Mr. Patchell's geenral introduction, and his particular references to boilers and steam engines, of which Sub-Committee he was Chairman, Mr. I. V. Robinson, Chairman of the Sub-Committee dealing with definitions and values of fundamental units and constants, mentioned that the code should not be used for testing very small plant. Commenting on the Committee's decision to employ gross calorific values for the fuel—a subject which was discussed at some length in the "Journal" for July 9, 1924, p. 250—Mr. G. James Wells (Chairman of the Sub-Committee's governing test codes, calorific values, &c., and methods of measurement and use of instruments, and of the Panel dealing with gas producers and gas engines) referred to the length of time necessary to make an accurate test. This, he said, was determined by the time taken before the plant attained steady working conditions; and thus the test period could not be fixed absolutely. Mr. Wells also called attention to the fact that the trials of heat engines should be made only by fully qualified engineers, and that the report was not intended to enable trials to be made by those not so qualified.

The Report.

The Report extends to well over 300 pages. The generators and prime movers included within the Committee's purview were boiler plants, steam reciprocating engines, steam turbines for land and marine purposes, condensing plant to operate with engines and turbines, gas producers, gas engines, petrol and paraffin engines, heavy oil engines, and compressors or blowers. In addition to the standard codes, explanatory notes are attached to each code setting out in detail the information which is to be given, and the general methods for arriving at the results and conclusions. Recommended methods of measurement, and information as to the use of instruments, have also been collated in appendixes; and further appendixes include notes on calorific values and specific heats of gases, together with a tabulation of the definitions and values of fundamental units and constants.

In the matter of temperature scales, it has been agreed that the Fahrenheit scale be adopted for use in the standard codes for recording the results of industrial trials, but that provision for both Fahrenheit and Centigrade scales be made for use in comprehensive trials for scientific purposes. Both B.Th.U. and calories have been used, and it has also been agreed to employ the therm where the number of B.Th.U. is large.

COAL AND BYE-PRODUCTS EXPORTS AND OIL IMPORTS.

Henceforward until the end of the year, in dealing with exports of coal and coke, there will be comparatively little interest in the figures relating to the corresponding months of 1926, in view of the coal stoppage, and the then turn of the tide from exports to imports. The actual comparison will have to be with 1925, although the figures relating to exports from the beginning of last month to the end of this year will show what this country lost in the way of fuel business abroad through the strike, making allowance for the current embargo which France has placed upon the import of coal to that country.

Coal Exports.

In May, the total quantity of coal of all kinds exported was 4,802,805 tons, compared with 1,448,368 tons last year, and 4,652,464 tons in May, 1925. The values of these quantities were: May, 1927, £4,407,722; May, 1926, £1,392,437; May, 1925, £4,798,756. Included in these figures are gas coal, of which 600,082 tons were sent abroad in May, compared with 167,548 tons in May, 1926, and 651,898 tons in May, 1925. The values were: May, 1927, £492,828; May, 1926, £137,005; May, 1925, £619,091. The average value per ton of gas coal exported last month was 14s. 3·9d.

For the five months ended May, the total quantity of coal sold abroad was 22,005,967 tons; in the same period of 1926, 18,929,604 tons; and in that of 1925, 22,114,598 tons. The values of these quantities were: 1927, £20,949,677; 1926, £17,191,388; 1925, £23,143,815. During the five months, the gas coal represented in the foregoing quantities and values was 2,880,006 tons, which compares with 2,491,787 tons in the corresponding period of 1926, and 2,937,991 tons in that of 1925. The values of the gas coals during those periods were: 1927, £2,501,950; 1926, £2,032,988; 1925, £2,934,024.

Gas and Metallurgical Coke.

The season of low demand for gas coke abroad has commenced. In May 33,147 tons were shipped, compared with 4402 tons in May, 1926, and 25,197 tons in May, 1925. The values were: May, 1927, £34,494; May, 1926, £4302; May, 1925, £32,950. The average value of the gas coke sent abroad last month was £1 0s. 9·7d. per ton. In the five months of this year, the total gas coke exported was 279,274 tons, which compares with 367,227 tons in the same period of last year, and 208,974 tons in that of 1925. The values were: 1927, £318,864; 1926, £378,820; 1925, £303,937.

"Other" coke appears to be picking up a little. But the business done so far this year is very much behind that of the two preceding years. In May 54,069 tons of metallurgical coke were exported, compared with 13,491 tons in May, 1926, and 84,204 tons in May, 1925. The values were: May, 1927, £69,904; May, 1926, £17,381; May, 1925, £107,110. The total quantity of metallurgical coke sold abroad in the five months ended May was 177,860 tons, compared with 373,235 tons in the same period of 1926, and 506,966 tons in that of 1925. The values were: 1927, £260,310; 1926, £425,550; 1925, £665,125.

Tar and Tar Products.

An almost infinitesimal business has so far been done in benzole and tuluole this year. The quantity sent abroad in May was only 3853 gallons; and during the five months ended May, the amount was 26,620 gallons, as compared with 418,388 gallons in the corresponding period of 1926. Naphtha is in worse case. Last month only 3009 gallons were exported, which makes a total of 14,113 gallons for the five months, as compared with 46,506 gallons in the same period of 1926. Regarding tar, oil, creosote, &c., the exports in May aggregated 4,115,464 gallons, compared with 4,175,437 gallons in May, 1926. In the five months ended May, the total under this heading was 18,238,827 gallons, as compared with 19,973,697 gallons in the corresponding period of 1926.

Sulphate of Ammonia.

Sulphate of ammonia succeeded in pulling up a little during May through a demand from Spain and the Canaries of 17,132 tons, and from Japan of 8158 tons. The total export for the month was 30,487 tons, as against 8613 tons in May, 1926. To the end of May, 79,662 tons have been shipped, compared with 90,813 tons in 1926. Our two principal buyers this year have been Spain and the Canaries with 30,864 tons, and Japan with 21,307 tons. France has not been a buyer.

Gas Oil Imports.

A considerable quantity of gas oil is still being poured into the country. The imports for May amounted to 4,470,187 gallons, which compares with 2,406,530 gallons in May, 1926. The total for the five months ended May is 48,972,441 gallons, as against 26,712,469 gallons in the like period of 1926.

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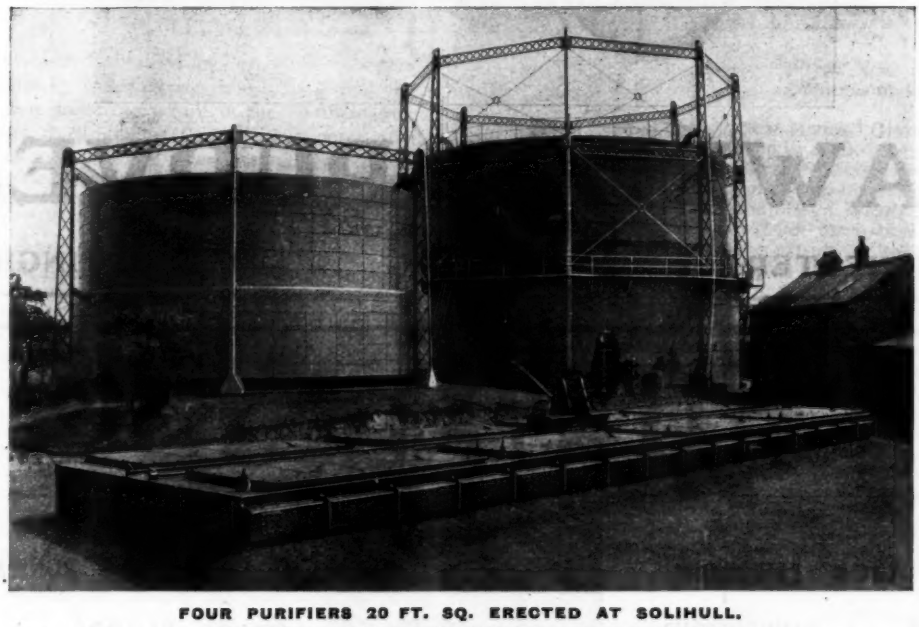

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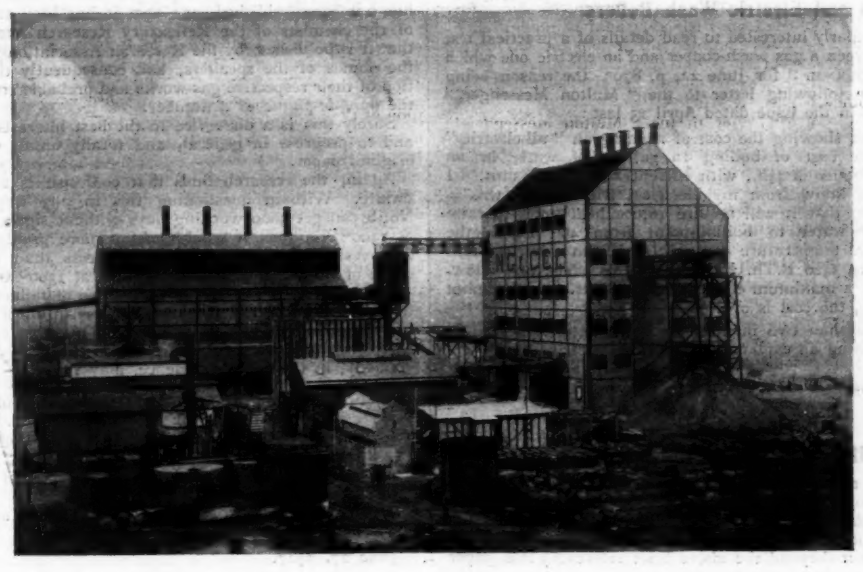
THE GLOVER-WEST INSTALLATION AT NEWCASTLE, N.S.W.

[From "West's Gas" for June.]



The City of Newcastle is situated on Port Hunter, 104 miles by rail and 62 miles by water from Sydney. It is the largest coal, steel, and iron producing centre in the Southern Hemisphere, and ranks third among the shipping ports of the Commonwealth of Australia and Dominion of New Zealand, coming next to Sydney and Melbourne. Newcastle and suburbs in 1915 had a population of 61,860, which had increased to 102,000 by 1926.

NEWCASTLE (N.S.W.) GAS COMPANY.

The City of Newcastle Gas and Coke Company, Ltd., was established 61 years ago—in 1866. The site chosen for the works was situated at Steel Street—two hundred yards off the main thoroughfare of Hunter Street. Gas was made available for public consumption in Newcastle on Saturday, Oct. 26, 1867. By Dec. 31 of that year, 9582 yards of mains had been laid. The original plant fulfilled the demand until 1888, when further plant was installed.

In 1910 proposals were afoot for the erection of new works at Clyde Street, Hamilton, about three miles from the heart of the city. Railway sidings were put in from the main Northern Railway; and on Tuesday, Jan. 21, 1913, the new plant was put to work. This carbonizing plant consisted of four settings of Glover-West vertical retorts arranged in units of 2's—eight retorts per setting, making a total of 32 retorts. The price of gas had been reduced to 3s. 6d. per 1000 c.ft. Gas made in the year 1868 was 3,035,000 c.ft., and in the year 1926 the make had increased to nearly 500 millions.

The plant, put to work in January, 1913, continued its work of gas-making until November, 1926, without being reset during this long period—working approximately 5000 days, efficiently carbonizing 2¾ tons of coal per retort per day—reflecting credit on the management of the works and the careful control of the carbonizing department, and also the exceptionally good work and materials which the contractors (West's Gas Improvement Company, Ltd.) put into the plant.

NEW CARBONIZING PLANT.

It was in 1924 that a new carbonizing plant was decided on; and West's Gas Improvement Company, Ltd., were again entrusted with the contract; the Gas Company constructing the necessary foundations of reinforced concrete. The first steel-work of the new plant was erected on Nov. 14, 1925, drying fires were put in on Aug. 5, 1926, and gas-making commenced on Nov. 22, 1926.

The plant consists of 32 "New Model" Glover-West vertical retorts, 33 in. by 10 in. at the top by 25 ft. long, heated in units of 4's, with a further two setting shells consisting of front and back walls with girder floor, complete with worm casings. The retort bench is encircled by one line of West's 70-ton per hour lip-bucket conveyor, with provision for a duplicate conveyor. Coke may be dumped in a heap outside, or taken over bunkers and passed down shoots to a 24-in. belt conveyor leading to the screen and storage hoppers.

Coal is to be brought by railway wagons to a receiving hopper at ground-level, and is mechanically fed to a fixed-bucket elevator and raised to a suitable height above ground-level to a West double-roll standard breaker. It then passes, by means of suitable shoots, below ground to the lipped gravity-bucket conveyor travelling below the retort bench, and upwards to overhead storage bunkers of 48 hours' capacity. To enable coal to be supplied from the existing stores, a system of belt conveyors is installed, which deliver directly above the breaker, which may be by-passed at will.

The machinery is all electrically driven; and all controls of motors appertaining to new plant are housed in one engine room built in one corner of the retort-house.

WORKING RESULTS.

At present twenty retorts only are actually under carbonizing heats, leaving twelve retorts as spare for future requirements, *plus* the two beds (sixteen retorts) when the shell settings are completed. The average yields of gas for the month of March worked out at 97 therms per ton of coal, of 567 B.Th.U. gross calorific value. The coal used is one of the best in Australia, and is procured from the Maitland coalfields, about twenty miles from Newcastle. The following is an average analysis for March:

	P.Ct.
Moisture	2·00
Volatile hydrocarbons	39·40
Fixed carbon	52·53
Ash	6·07
	100·00

Will.—The late Ald. Albert Cliff, of Stamford, whose bequests included £50 each to the Stamford Infirmary and the Stamford Nursing Society, left £10,306.

Waverley Association.—Owing to pressure on our space this week, the publication of the paper read by Mr. Henry R. Hiscott, of the Le Bas Tube Company, Ltd., on "The Manufacture of Malleable Iron Pipe Fittings" is deferred until a future issue.

Manchester District Institution of Gas Engineers.—We learn from Mr. William Rogerson, the Hon. Secretary and Treasurer of the Institution, that the members will hold their quarterly meeting at Wentworth Woodhouse on Friday, July 22. By the kind invitation of the Modern Transport Company (the Right Hon. the Earl Fitzwilliam, K.C.V.O., C.B.E., D.S.O.), a visit will be paid to the South Yorkshire Chemical Company's Works. This is one of the most modern coke-oven and chemical plants in the country, and well worth inspection. A visit will also be paid to Wentworth Woodhouse, the residence of the Right Hon. the Earl Fitzwilliam, who has generously invited the members to lunch. Mr. Rogerson is very anxious that members shall send in their notifications of intention to participate in this meeting not later than Saturday, July 9, in order that adequate arrangements may be made for their comfort.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Gas and Electric Wash Boilers.

SIR,—I was particularly interested to read details of a practical test made at Ludlow between a gas wash-copper and an electric one which appeared in the "JOURNAL" for June 22, p. 879; the reason being that I addressed the following letter to the "Malton Messenger," and it duly appeared in the issue dated April 15 last:

> I see in the booklet showing the cost of running an "all-electric" home that the cost of boiling 10 gallons of water in an electric wash boiler is 4½d., with current at 1½d. per unit. I should like to know from my electrical friends how this is possible, seeing that it will require 16,600 heat units to raise 10 gallons of water to boiling-point from 46° Fahr.—the present average temperature of tap water. An electrical unit is equivalent to 3420 B.Th.U.; and on this basis, and allowing the washer a maximum efficiency of 100 p.ct. (which cannot be maintained), the cost is over 7d.

Though it is more than two months since the letter appeared in print, I am still awaiting an explanation from my electrical friends.

THOMAS LAW.

Gas-Works, Malton,
July 2, 1927.

Premature Holing of Silica Horizontal Retorts.

SIR,—It comes as rather a shock to find that the gas industry in general has for so long a time been denied the benefit of the excellent illustrated paper by Mr. H. V. Corfield (announced in the "JOURNAL" for April 6, p. 33) and the discussion it engendered.

It would appear that (beyond the above brief reference) this paper has not been published, and that it has been suppressed for the use of the chemists of the Refractory Research Association. Even now that it is published (by the Research Association in abbreviated form), the names of the speakers, and consequently the geographical position of their respective gas-works and probable coals, are hidden under the *nom-de-plume* of a number.

Surely this is a disservice to the best interests of the gas industry and to progress in general, and totally unfair to the author of the original paper.

Again, the research finds that coal ash is the root cause of the failure. Without questioning this in any way, surely if Speaker No. 8 can get 3000 working days without sign of trouble from silica at 1400° C., then it would be far more profitable for the industry to investigate the cause of his success than to re-investigate the cause of failure at 153 working days at 1300° C.

In any case, if ash be the root cause of failure, then it is essential to know how the ash in successful use in silica differs from the ash in the non-successful use of silica. This vital comparison has seemingly been omitted from the research.

Lastly, in the cause of science, may I plead—

(1) For the publication in the "JOURNAL" of the paper and discussions in full.
(2) The advisability of the withdrawal of the concluding words of the Refractory Research Association: "Further information is for the present only at the disposal of the members of the Refractory Research Association."
(3) For the publication of all information available at an early date.

June 27, 1927. AD REM.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

Basingstoke, Newquay (Cornwall), and South Suburban Gas Orders: Referred to the Special Orders Committee.

Greenock Burgh Extension Bill: Read a second time, and committed.

Newquay (Cornwall) and South Suburban Gas Orders: Referred to the Special Orders Committee.

Scarborough Gas Company (Consolidation) Bill: Read the third time, and passed.

Smethwick Corporation Bill: Read a second time, and committed. Since—reported, with amendments.

Royal Assent.

The following Bills received the Royal Assent on June 29: Commercial Gas, Farnham Gas and Electricity, Matlocks Urban District Council, Reading Gas, and Stoke-on-Trent Corporation (Gas).

Special Orders.

It was reported from the Special Orders Committee that no petitions had been presented against the Cleethorpes, Flint, Newport Pagnell, and Tiverton Gas Orders, and that there was nothing to which it was necessary to call the attention of the House.

HOUSE OF COMMONS.

Progress of Bills.

Basingstoke Gas Order: Copy presented.

Bognor Gas and Electricity Bill: Reported, with amendments.

Scarborough Gas (Consolidation) Bill: Read the first time, and referred to the Examiners.

Gas Mantles.

Replying, on June 28, to Mr. Harris, Sir PHILIP CUNLIFFE-LISTER said the imports of gas mantles in the first four months of 1925, 1926, and 1927, respectively, were 67,656, 14,958, and 11,203, gross.

Mr. HERBERT WILLIAMS asked the President of the Board of Trade whether he had any information as to the wholesale and retail prices of gas mantles before and after the imposition of the safeguarding duty.

Sir P. CUNLIFFE-LISTER replied that he was informed that the average price realized by the members of the trade association on the sale of all their mantles during the year ended March 31 last showed an increase of 1s. a gross on the average price realized by them during the preceding year. These sales were estimated to cover 85 p.ct. of all the mantles sold in this country. Against this there had been increases in the cost of certain materials. The retail prices of the classes of mantles most commonly used had, so far as could be ascertained, remained substantially unchanged.

BOGNOR GAS AND ELECTRICITY BILL.

The Unopposed Committee of the House of Commons, presided over by Mr. J. FITZALAN HOPE (Chairman of Ways and Means), on Wednesday, June 29, ordered this Bill to be reported for third reading.

The main provisions of the Bill were explained to the Committee by Mr. C. E. C. Browne (Messrs. Dyson, Bell & Co., Parliamentary Agents). These are to enable the Bognor Gas Light and Coke Company to change their name to the "Bognor Gas and Electricity Company," inasmuch as the existing name does not indicate that the Company supply electricity; to authorize further capital powers of £100,000, and borrowing powers to the extent of half the capital raised; and to authorize the extension of the Company's limits for the supply of gas and electricty. In reply to the Chairman, Mr. Browne said at present the limits for the supply of gas and electricity were the same, but the proposed extensions were not identical, and the electricity area would be larger than the gas area. (The details of the proposals were set out in the "JOURNAL" for Jan. 12, p. 83. There was opposition in the House of Lords with regard to the extension of the electricity area, and the original proposals were modified, as reported in the "JOURNAL" for March 30, p. 820.)

Mr. BROWNE said that reports had been submitted by the Ministry of Transport and the Board of Trade with regard to the provisions of the Bill, and substantially effect had been given to the recommendations in those reports. At any rate, any exceptions from complete compliance with the Board of Trade recommendations had been agreed to by the Board.

A clause to which reference was made in the Board of Trade report was one relating to charges for special readings of gas meters; and Sir ERNEST MOON, K.C. (a member of the Committee), asked for more information with regard to it.

Mr. BROWNE said that the Company sought power to charge 1s. for special readings inside the Borough of Bognor, and 2s. outside. The reason was that if a special reading had to be made outside the borough, and probably on the fringe of the area of supply, the cost of transport was considerable, and a charge of 2s. for a single inspection would not even recoup the Company for the expense incurred in many cases. Therefore, though the Board of Trade had suggested that 1s. was the maximum charge which should be allowed, the Company suggested that it would not be unfair if they were allowed a maximum of 2s. for special readings outside the borough.

SCARBOROUGH GAS COMPANY (CONSOLIDATION) BILL.

This Bill (see "JOURNAL" for Jan. 19, p. 145) was before the Unopposed Committee of the House of Lords some weeks ago, but has only recently been reported for third reading. In the interim it has been subjected to close consideration, and has emerged with its original provisions considerably amended, and a number of added clauses.

The limits of supply and the amount of capital (£400,000) remain as stated in the "JOURNAL." New stock is to be sold by auction or tender (except in the case of stock offered to employees under a profit-sharing scheme, as provided for in a later clause). Any stock offered but not sold by auction or tender may be offered at the reserve price to the holders of stock of the Company, and to the employees and consumers, and if not sold by either of these two ways, it may, for the purpose of realizing the best price obtainable, be otherwise disposed of at such price and in such manner as the Directors may determine. There are borrowing powers to the extent of half the paid-up capital.

With regard to the basic price and dividend provisions, the basic price has been amended to 9·2d. per therm, but the charge to be made to consumers in that part of the rural district of Scarborough which is at a greater distance than half-a-mile from the boundary

of the Borough shall exceed by 2·4d. per therm the price charged in the remainder of the limits. The Act is to come into operation on Jan. 1, 1928, and the provisions with regard to charges are to have effect as from the reading of the consumers' meters for the December, 1927, quarter. The basic dividend on ordinary capital is fixed at 5 p.ct., and this is the maximum rate of dividend on the preference stock.

There are amendments to the clause dealing with the division of surplus profits when the price charged for gas is less than the basic price. The calculation of the consumers' benefit—*i.e.*, the difference between the amount actually paid by consumers for gas and the amount which would have been paid if the basic price had been charged—is to be made yearly. If there is a sufficient balance in the net revenue account, a sum equal to one-sixth of the amount of the consumers' benefit may be applied to increase the dividends on ordinary capital above the basic rate, and if and so far as it is not so applied, it shall be carried to reserve fund. Whereas originally the clause provided that it should be competent for the Company to apply for the benefit of the employees such a share of surplus profits (not exceeding one-sixth of the consumers' benefit) as might be allowed under any co-partnership scheme established under the Act, it has now been amended so as to provide that no money shall be applied to increase of dividends or carried to reserve fund unless the Company shall also appropriate, out of such balance, an equal sum to the credit of any profit-sharing scheme established under the Act for the benefit of the employees.

Another clause has been inserted imposing further obligations upon the Company with regard to the basic price. Under this clause the Company are from time to time to file for public inspection with the local authority and with the Board of Trade statements of the conditions under which they are prepared to grant discounts on prices charged for gas supplied by them—such discounts to be alike in like circumstances. No sum is to be divided in excess of the basic rate or carried to reserve fund, or appropriated to any profit-sharing scheme established under the Act, in respect of any year in which the price charged to ordinary consumers is equal to, or more than, the basic price, with (where applicable) the addition required to be made in the outer part of the limits of supply. If the rate of dividend paid on the ordinary capital in any year (in which they could have paid a dividend at not less than the basic rate) is less than the basic rate, the difference between the amount so paid and the amount which would have been paid if the Company had declared a dividend at the basic rate may be carried to reserve fund. Again, the Company are to send to the Board of Trade each year, with the accounts required under section 15 of the Gas Regulation Act, a statement showing the number of therms sold at each of the several net prices during the year to which the accounts relate (including gas supplied to public lamps), and such other revelant information as the Board may require. For the year 1928 and subsequent years the accounts are to show separate particulars of the gas supplied by the Company in the inner and outer parts of the limits, and such particulars as will enable the local authority to calculate the amount which for such year may be paid as dividend or carried to reserve, and appropriated to a profit-sharing scheme.

The reserve fund to be formed is to be applicable in or towards increasing above the basic rates the dividends on ordinary capital, or the payment of dividends on ordinary capital at the basic rates, in any year in which the profits shall be insufficient for the payment of dividends at the basic rates, or to such other purpose as the Directors may determine. There is also power to create a special purposes fund out of revenue; the maximum sum to be so appropriated in any year being 1 p.ct. of the amount of the paid-up capital. The amount of money in the fund must not at any time exceed one-tenth the amount of the paid-up capital.

As already indicated, the clause authorizing the adoption of a profit-sharing scheme includes power to issue consolidated ordinary stock to employees without first offering it for sale by public auction or tender; but such stock is to be issued at the then market price of the same class of stock, or, if there be no such market price, at a price to be determined by the Company's Auditors as being a fair price. There is also power to grant pensions.

An important clause is one providing that not later than the session 1932 the Company are to promote a Bill in Parliament proposing a revision of the basic price or giving an opportunity for such a revision to be made. The Corporation and the Council of any urban or rural district within the limits of supply are to be entitled to be heard on such Bill. This, of course, is in line with the obligation placed upon the South Metropolitan Gas Company in their Act of 1920, which Act authorized the application by them of the basic price and basic dividend scheme.

The Company are empowered to acquire certain lands compulsorily, but are not to purchase or take any of the property of the London and North Eastern Railway Company without their consent in writing.

There is an amendment to the clause giving the Company power to demand security for payment of rates. Originally the clause provided that the Company should be empowered to demand of a consumer security for the payment of one year of the rate for the gas to be supplied. The clause now gives the Company power to demand security for the payment of all moneys which may from time to time become due to them in respect of the supply.

There are clauses for the protection of the Scarborough Corporation, the North Riding County Council, and the London and North Eastern Railway Company. The latter contains a provision, among others, that if at any time it is found necessary, in order to enable the Railway Company, under powers existing at the date of this Act, to carry out alterations, widenings, or extensions of their existing railway or works, to alter the position of the Gas Company's works authorized by this Act, the Gas Company shall, on one month's notice, at their own cost and with all reasonable dispatch, make the alteration in accordance with plans reasonably approved by them or their Engineer so far as may be reasonably necessary (but so as not to interrupt or interfere with the continuous supply of gas). Any additional expense which the Railway Company may reasonably incur in widening, altering, reconstructing, repairing, or maintaining their railway or other works under powers existing at the date of this Act, by reason of the existence of works constructed by the Gas Company, under the powers of this Act, and not being renewals of the works of the Gas Company existing at the passing of the Act, upon, across, over, or under the railway or Railway Company's works, shall be paid by the Gas Company.

MISCELLANEOUS NEWS.

BIRMINGHAM GAS DEPARTMENT'S ACCOUNTS.

The Birmingham Corporation Gas Committee, in their annual report to the City Council, state that the accounts for the year ended March 31 showed a surplus of £78,384, which has been transferred to appropriation account. From that surplus a contribution of £41,200 had been made to the borough fund; the balance of £37,184 being transferred to renewals and special expenditure account.

The total capital authorized amounts to £4,553,124; and of that amount £320,839 still remains to be borrowed. The total capital raised equals £4,232,285, of which £1,533,904 has been repaid. The capital account shows an unexpended balance of £243,386 15s. 8d. During the year, repayments on account of stock and mortgages have been made to the extent of £38,628, and together with annuities purchased through the sinking fund, to the value of £7532, make the total capital redeemed during the year £46,160.

The revenue account shows a total expenditure of £2,552,499—a figure considerably in excess of the one recorded at March, 1926—the principal cause for the increase being the higher charge for coal consequent upon the purchase of foreign material. Coal and oil cost £307,906 more than in the previous year. The coal carbonized during the year amounted to 695,178 tons (a decrease of 121,898 tons compared with 1925-26), while 5,191,903 gallons of gas oil were used—an increase of 3,480,312 gallons. The gas sold and used on the works was slightly in excess of 13,338 million c.ft., a figure a little below that for the previous year, when the quantity was 13,389 millions. The return from residual products shows an improvement. The credit balance on revenue account, £247,158, was transferred to profit and loss acount; and after charging annuities and interest, together with the amounts provided for redemption of debt, a surplus remains of £78,384.

The Committee state that the total quantity of imported coal purchased during the labour troubles last year was 132,770 tons; practically the whole of it coming from America. In addition it was possible during the trouble to purchase 107,318 tons of English coal of varying quality at an average price approximate to the amount paid per ton for American coal. During the stoppage 240,088 tons of coal were obtained at a cost of £365,630 in excess of ordinary prices. The continuance of the gas supply without restriction during the trouble was a formidable undertaking.

In their report to the Council in March last year the Committee gave details of the installation of gas supplies in court and terrace houses. Since that date great progress has been made; and during the twelve months ended March 31, 2350 houses contained in 420 courts and terraces have been fitted up for gas supplies, which represents a record for the work, and is an increase in the number of houses fitted over the previous twelve months of 25·8 p.ct.

The Committee report further that they have purchased premises at Harborne for the purposes of a branch depôt and offices, at a cost of £8000; and that they propose to erect new meter and stove repairing shops at the Windsor Street Gas-Works at a cost of £12,000. The therm basis of charge is to be adopted in June of next year.

ASSOCIATION OF PRIVATE OWNERS OF RAILWAY ROLLING STOCK.

The Thirty-Sixth Annual Meeting of the Association was held at the Midland Grand Hotel, London, on Friday, June 24, under the presidency of Mr. JOHN CHARRINGTON, the Chairman.

The CHAIRMAN, in moving the adoption of the Committee's report and the balance-sheet for the past year, commented on the satisfactory financial position of the Association, and reported a still further increase in membership. At the same time he pointed out that, in order to maintain and promote the interests of private ownership to the fullest extent, every private owner should be enrolled as a member; and he expressed the hope that any who had not yet done so would apply to the Secretary, Clarence Chambers, Gloucester, to join without delay. The Chairman then referred in detail to the various matters of importance and intricacy that had been dealt with by the Committee during the past year, and had been brought to a successful issue.

The resolution was heartily supported, and appreciation expressed of the work done. The report was then formally approved and the resolution for its adoption passed unanimously.

Cordial votes of thanks to the Chairman and Committee for their valuable services during the year were proposed and carried unanimously.

BRADFORD GAS DEPARTMENT.

In his report for the year ended March 31, Mr. E. J. Sutcliffe, the Engineer and Manager of the Bradford Gas Department, states that the year has been a difficult one by reason of the coal stoppage. At the commencement of the strike, they were prepared with a stock of 34,000 tons of coal, or sufficient for fifteen weeks' normal requirements; and it was not necessary to purchase additional supplies until July, when the Sewage Committee released coal from the filter beds at Esholt, and thus avoided the necessity of the Department having to purchase at still higher prices any large quantity of imported coal. Some of the Department's coal assisted householders at a time when supplies from other sources were not available. During the stoppage the demand for coke greatly exceeded production, but the stock of 10,000 tons held at the commencement helped considerably to alleviate the position of industrial and domestic users. Towards the end of the stoppage it was necessary to restrict sales to essential services and domestic users only. Though increased demands were made upon the Department, they were able to maintain a full supply of gas of normal quality throughout the strike; and consumers were not inconvenienced at all.

The financial statement, prepared and presented by the City Treasurer, shows that the gross income for the year amounted to £595,820, and the expenditure to £569,366, showing a gross profit of £26,454. After providing for interest on loans, &c., £43,810, contribution to sinking fund £13,833, and income-tax £4274, there is a loss on the year's working of £35,463. In comparison with the figures for the preceding year, the gross income is increased by £88,851, and the gross expenditure by £140,093, while the charges for interest on loans, &c., sinking fund, and income-tax are less by £8191. The deficit of £35,463 compares with a profit during the preceding year of £7588. The net revenue appropriation account, which at the commencement of the year had a credit balance of £41,426, has been debited with an appropriation for the relief of the city rate of £7500, and a sum of £2896 to cover the balance of the costs in the Briggs' case and an adjustment of liabilities at March 31, 1926, on Chemical Works account. There is now a debit balance of £4433 on this account.

The total sales of gas for the year show a slight decrease of 5,773,000 c.ft., or 0·28 p.ct.—the year's total being 1,998,892,000 c.ft., compared with 2,004,665,000 c.ft. in 1926. An increased demand for cooking, heating, and other domestic purposes has been met, and the requirements for industrial purposes compare favourably with recent years; but the curtailment of street lighting during the operation of the Emergency Regulations, and in later months the reduction in the number of lamps on the adoption of electricity for lighting the tramway routes in the city, have reduced the quantity of gas used for street lighting by 31,309,000 c.ft.

POSITION REVIEWED AT STOKE-ON-TRENT.

Past and Future Discussed.

Matters of importance are dealt with in the report for the year ended March 31 on the City of Stoke-on-Trent Gas Department, which has been prepared by Mr. A. Mackay, the Chief Engineer and General Manager. After pointing out that the undertaking continues to make exceptionally rapid progress—the quantity of gas manufactured during the year, at 1494 million c.ft., showing an increase of more than 65¼ millions over the preceding year—Mr. Mackay proceeds to discuss the situation in some detail.

Coal Dispute.

Referring to the coal stoppage, Mr. Mackay says that, by a judicious use of coal stocks already in reserve, drastic alterations in methods of working, and energetic measures to augment supplies from every possible source, the Department was able to meet every demand made upon it by its consumers; and it is a striking testimonial to the financial stability of the Department that this was done without increasing the selling price of gas. During the crisis all classes of fuel were employed, including large quantities of outcrop fuel of very poor quality—being at time almost non-coking, and containing a high percentage of ash. No less than 24 different varieties of this outcrop coal were fully tested, and approximately 200 tested as to their coking qualities. The variation on these tests is most interesting:

The volatile matter varied from 17 to 39 p.ct.
The ash varied from . . . . 3 to 55 p.ct.

Other difficulties were experienced in the use of foreign coal—as in the case of Westphalian, which gave considerable mechanical trouble by reason of its high moisture content and state of fine division, while American coal appeared to have an extremely fusible ash. Six different foreign coals were tested, also with considerable variation:

The volatile matter varied from 17 to 36 p.ct.
The ash varied from . . . . 5 to 14 p.ct.

Then 24 other coals from various sources were tested; and the variation in these cases was almost as marked as in the two former:

The volatile matter varied from 26 to 36 p.ct.
The ash varied from . . . 1·5 to 37 p.ct.

A very serious handicap to the Department was the necessity of supplying the most suitable fuels to the Burslem Works, on account of their inclined retorts. It was necessary to have the size of washed fuel which was suited to the angle of repose of these retorts; and the better classes of fuel suitable for Burslem were transferred from the stocks at Etruria.

Having these facts in mind, the comparative returns for this and the previous year from the carbonizing plant show that the results have not suffered to any appreciable extent. While the output of gas for industrial purposes was reduced to very small proportions, the increase in the domestic demand was such as to outweigh this reduction, and to create a net increase in the sales of gas for the seven months of the industrial crisis of 35½ million c.ft. as compared with the corresponding period of the previous year.

Value of Water Gas Plant.

The advantage of the water gas plant has been evident for some time; but Mr. Mackay does not recall an occasion when the satisfaction it gives, the security it provides, and the reliability of its operation were so fully proved as last year. These experiences have confirmed the opinion that the provision of water gas plant forms one of the safest bulwarks against difficulties in gas manufacture arising out of disturbance in other industries. The increase in the proportion of water gas made by the undertaking during the seven months of the coal stoppage resulted in the reduction of 10,000 tons of coal in the quantity it had been expected to carbonize in the coal gas plants.

Future Responsibilities.

The rather colder weather experienced during the last two months of the year, compared with the previous year, has caused a heavy demand for gas. More convincing figures, however, showing the popularity of gas and its acceptance by the community as the best agent for heating purposes are those displaying the steady and increased rate of consumption during the last few years. For the area now served by the undertaking, the figures are:

Year.	Gas Sold. Thousands of C.Ft.	Increase. Thousands of C.Ft	Increase P.Ct. on Previous Year.
1924	1,202,100	39,566	3·40
1925	1,245,993	43,892	3·65
1926	1,281,701	35,708	2·87
1927	1,348,979	67,278	5·25

Finance.

The total expenditure for the year has been £269,696, as against £226,918 for last year, showing an increase of £42,778. The major portion of this is on the items under "Manufacture." The gross profit carried to profit and loss account is £42,217, as against £63,893; and the net result for the year is a deficit of £19,951. It has been decided to take this amount out of the reserve account.

Centralization.

An important part of the work of centralization reached completion during the autumn, when the new chemical works came into operation. Apart from minor difficulties almost inseparable from the starting-up of plant of this nature, both the sulphate and tar sections have continued to work well since. Other constructional work completed during the year includes the laying of further new railway sidings, the equipment of the joiners' shop, and the building of new offices at Etruria.

The contracts for an installation of vertical retorts and their auxiliaries, and for a set of purifiers, have been placed during the year; and the work on both is proceeding. After considerable difficulties, necessitating the taking of parliamentary powers, the way has been cleared for the laying of a high-pressure main through Wolstanton to Burslem.

GAS *v.* ELECTRICITY.

At a conference of the Ulster General Council of Municipal Authorities, held at Newry on June 25, Mr. Barker Mitchell, of Bangor, read a paper on "Gas in the Public Service." [The meeting was noticed briefly in last week's "Journal."] Mr. William Robinson, J.P., Chairman of the Newry Urban District Council, presided.

Mr. Mitchell gave interesting information regarding the growth and development of the gas industry, and the many advantages of gas for lighting and heating. The general use of gas as a heating and cooking agent was shown by the numbers of cookers and fires on consumers' premises, amounting to 6½ million cookers and 10 million fires. The popularity of gas for lighting in public streets was shown by a census taken of 1000 cities and towns in Great Britain and Ireland. Out of 670,300 public lamps, 585,600 were gas (87 p.ct.) and 84,700 were electricity (13 p.ct.). Coal was not a fuel, said Mr. Mitchell, but should be considered as a raw material from which fuel, among other things, might be obtained. In the direct burning of coal, only 25 p.ct. of its heat value was utilized, while 75 p.ct. was lost. By the use of gas, the percentages were exactly reversed. [Applause.]

Senator Magee (Derry), in proposing a vote of thanks to Mr. Mitchell, said he was glad to be able to agree with everything that he said; and he thought most of them would appreciate the paper. The author had shown them the advantages which gas possessed. There was a time when there was jealousy between gas and electricity; but now they realized that each had advantages. He complimented Mr. Mitchell on the able manner in which he delivered the paper.

The Chairman remarked that it would have been exceedingly interesting had there been someone there representing electricity; but then they might have had a violent debate. [Laughter.]

Mr. Legg (Carrickfergus) said that in his town they were thinking of installing electricity, and he would be glad to have copies of the paper, which he highly appreciated.

The Chairman described Mr. Mitchell as the Manager of the largest gas-works in Ireland, outside Belfast. He had made the works an enormous success, and he hoped that some of the larger authorities would not cast envious eyes on Mr. Mitchell, and induce him to leave Bangor.

Mr. Milliken (Town Clerk, Bangor) said that in Mr. Mitchell the Urban Council of Bangor possessed one of the most far-seeing gentlemen it was possible for a municipal body to possess.

CO-PARTNERSHIP IN THE SOUTH SUBURBAN COMPANY.

Between the first and second parts of an excellent entertainment, the South Suburban Gas Company held on Saturday last, at the Crystal Palace, their annual co-partnership meeting. The auditorium of the theatre was crowded with co-partners and their wives or sweethearts, who, after spending a thoroughly happy afternoon there, were the guests of the Company at tea. During what may be termed the business proceedings, Sir J. FORTESCUE FLANNERY, Bt. (the Chairman of the Company), with his co-Directors and the principal officers, occupied the stage; and there were some brief speeches, all of which testified to the beneficent effects of co-partnership.

UNSHAKEN FAITH.

The CHAIRMAN said nothing had happened since the meeting a year ago to shake the faith of every one of them in the bond that joined them together—nothing except the dilatoriness and the stupidity both of the rulers and of the people of this country generally. Last year they met just after the general strike had closed, and in the midst of the coal stoppage. Shakespeare had said: "The evil that men do lives after them, the good is oft interred with their bones." So it was with trade disputes. The evil lived after them. Within a recollection now approaching half-a-century of trade and workshop experience, he (the speaker) did not remember a single strike or lock-out, or other trade dispute, that had been worth while in proportion to any good that it might have left behind. In the coal trade there had been evil done that would live after the dispute. It would be remembered how they had had to work with German and American coal, because they could not get the good old English coal. It was discovered that the German coal was bad, but that the American coal possessed certain good qualities which were never suspected before. Some of the foreign buyers of coal also had discovered during the stoppage these good qualities; and some of the markets for British coal had thereby been taken away, and probably would never be restored. Thus permanent injury to the trade of the country had been done. This was one of the evils that the stoppage and the general strike had left behind them. Another almost equally great—if not quite as great—evil that had been left behind was the ill-feeling which still existed between employer and employed in many of the mining districts in this country. He was in South Wales not long ago, and was distressed to find there was still seething discontent and ill-will existing between the two sides. Thus it was that he had spoken of the stupidity of the people of this country and their rulers, when, with pictures of this kind before them, they had not followed the splendid example in the other direction which the gas industry showed them of that co-operation, brotherly feeling, goodwill, and community of interest between employer and employed which ought to exist in every civilized place.

CO-PARTNERSHIP AND EMPLOYMENT.

Each year their faith in co-partnership increased. The present unemployment—there were a million persons out of work, or nearly so, to-day—would not exist if co-partnership were general. If every worker had a direct share, as he must have an indirect share, in the prosperity of the concern with which he was associated, economic production would increase, and this country would be able to compete in the markets of the world. This was a question so large, so serious, that he could not too emphatically ask them to think well about it. In this country it was impossible to grow food enough to sustain the people. There was grown in this country something like one-fifth only of the food consumed; the rest had to be imported, and coal and manufactured goods had been given in exchange. Therefore they should realize that every worker in the country must work according to the best that was in him, lest starvation overtake him. Their Company had for 33 years been setting an example which the nation ought to follow. During all this time brotherly feeling, each man for his co-worker and co-partner, had prevailed. There were not only the financial conditions of employment which formed part of co-partnership, but there was the raising of the tone—the moral character—of those who were concerned in it. The number of accidents in their works had in the past year been less than before; and he ventured to think that the plan by which every accident was inquired into and every precaution that could be suggested by experience was taken for the future—which really formed part of the co-partnership system—had a share in the credit for this reduction. Co-partnership was a subject upon which he was never tired of speaking—upon which he had spoken many times in Parliament, and upon which, if God spared him, he would speak again and again, until the people of this country recognized, as they must ultimately recognize, the necessity of carrying out the reform with which that Company had been associated so long. Those present might congratulate themselves that they were doing a great work for the country, and that by their loyalty, by their fraternity, by the steadiness with which they were pursuing their course, they were serving their day and generation, and doing much for the benefit of the human race. This was the spirit underlying the gathering that day.

THE ACCOUNTS.

Mr. JOHN BAKER (the Co-Partnership Secretary), reporting upon the funds and accounts, remarked that the amount of bonus credited to 1554 co-partners for the twelve months ended December, 1926, was £12,832, being at the rate of 4¾ p.ct. on salaries and wages. The savings for the year amounted to £10,188, and the withdrawals to £8216. The balance standing to the co-partners' credit on Jan. 1 was £36,315; while 1217 co-partners also held £97,980 of 5 p.ct. ordinary stock of the Company, and 66 superannuated members held £14,128 of stock. The total amount of bonus credited to co-partners since the scheme was started in 1894 was £132,866. During the period 1894-1926, a large number of employees had been superannuated, had died, or had left the Company's service. Yet, notwithstanding the large amounts withdrawn from the co-partnership on such occasions, the co-partners' holding of stock and deposits in the Company was more than the total amount credited in bonus from 1894 to 1926 by £1429. As to the accident fund, he was pleased to say that there had been a satisfactory decrease in accidents during the year; the number being 58, as against 68 for 1925, and 74 for 1924. He might say that 58 was the lowest figure for several years past.

WORKS COMMITTEE.

Mr. CHARLES J. CARTER (Secretary of the Works Committee and an Employee Director) said that during the twelve months that had elapsed since the last meeting, the duties of the Works Committee had been exceedingly light. They had not had one single real grievance submitted to them during the whole of this period. ["Hear, hear."] In the earlier years, full use was made of what was then a new piece of machinery; and he thought the Committee might take credit for the efficient manner in which they had carried out their duties in relation to working conditions, seeing that the position to-day was probably unexampled in any industrial undertaking of similar magnitude in the country. One thing the Committee had done was to bring the working co-partners into closer touch with the managing officials of the Company; and he was quite sure that they understood each other better, and realized each other's point of view more fully, now than they did when the Works Committee was instituted. Some of the matters which the State in recent years had thought it its duty to take up, their Company had by many years forestalled it in. For example, provision for sickness, superannuation, accidents, &c.—things affecting the working lives of their people. In conclusion, he made the interesting announcement that the Company had decided to avail themselves of an opportunity that had offered to acquire a sports ground in the immediate neighbourhood of the Sydenham Works for the benefit of the employees. [Applause.] There was nothing like co-partnership to improve the relations between the employees and the officials of the Company, and to elevate the status of the workers and give them something to look forward to in the future.

Mr. THOMAS W. ANSET moved that the report of the Works Committee for the past year be adopted; and this was seconded by Mr. FRED READ.

A GREAT IDEAL.

Dr. CHARLES CARPENTER, C.B.E., said they were there that afternoon in pursuance of a great ideal—the co-partnership ideal. He referred to the fact that the frame of mind in which a man set out to follow his daily employment was too often not what it should be. Under co-partnership conditions, however, there was no doubt whatever—and he was sure the Works Committee would bear him out in this—that a man's attitude towards work was very different from that which he felt only too surely was the general attitude in industry in this country. Now, if co-partnership did produce a happy atmosphere of this kind, it would undoubtedly result, as the Chairman had pointed out, in industry being carried on more successfully, in the elimination of that terrible problem of the large number of unemployed, and in the keeping of this country (in face of the competition from all quarters which it had to meet) in the proud position it had occupied in the past of leader among the nations.

FURTHER TESTIMONY.

Mr. W. G. WALLER (an Employee Director) thanked the Board for their kind invitation to the co-partners to attend the meeting. The occasion, he said, was one that always appealed to every co-partner in the Company, and strengthened each year the friendly bond between employers and employees. Looking back over past troubles in non-co-partner firms, one could not help drawing a comparison between the smooth-running, keen, efficient working of a true co-partnership organization and the restlessness and misunderstandings prevailing under less enlightened systems. He earnestly appealed to the co-partners to continue to do their best for the prosperity of the Company.

Mr. JOHN TERRACE (Chief Engineer) declared that the relationship existing between the Works Committee and the chief officials was always of the happiest. They approached difficulties in the way that they should be approached—with a mutual desire to do the best for the concern—and they were proud to find that the record for the past year had been such a good one.

Mr. WILFRID WASTELL (Secretary) remarked that he was afraid they often forgot, when they were telling each other of the benefits of co-partnership, the names of those who made co-partnership possible. Sir George Livesey was the founder of co-partnership as they understood it in the gas industry. Then there was Dr. Carpenter, upon whose shoulders Sir George's mantle had descended. To their Chairman (Sir Fortescue Flannery) and their Directors, they owed a debt which no words of his could measure. It was only because of the firm adherence of the Directors to the principles of co-partnership,—and, what was more important to them, to the practice of co-partnership—that they were all enabled to enjoy its inestimable privileges and benefits. They should at times turn their minds to those who had made this wonderful thing possible.

The report of the Works Committee was unanimously adopted, and thereafter the CHAIRMAN explained that for the new sports ground the Company had purchased 5 acres of land within an easy walk of the works, and that this would be laid out in the best possible manner for cricket, football, or any other games that might be desired.

On the proposition of Mr. READ, the Chairman was heartily thanked for having presided.

Cheaper Gas at Salford.—The Salford City Council have decided to reduce the price of gas to all consumers by 6d. per 1000 c.ft., as from the end of September. Alderman Phillips said that the deficit had already been reduced from £100,000 to £60,000.

AN EATON ROMANCE.

A Nasty Story—An Inside View of Operations.

"A nasty story" was the description given by Mr. H. E. Burgess, Senior Official Receiver, to the report he had to make at the first statutory meeting of the creditors of the Wareham Electric Supply Company. The particulars upon which this story is written were obtained from an account of the proceedings in the "Financial Times."

The Company was established in October, 1920, with a nominal capital of £5000, to carry on business as an electric light undertaking. The original issued capital of £3990 was expended in the purchase of land, a small generating station, and in obtaining authority from the Electricity Commissioners. Owing to lack of capital the works and mains were not completed; and in August, 1922, the Company went into voluntary liquidation.

Eaton Comes on the Scene.

Col. E. O. Eaton, acting through his lieutenant, Mr. Royce, came on the scene, and purchased the undertaking from the Liquidator for £1400, which cleared off the then existing liabilities and costs, and enabled a return of 3s. 5d. in the pound to be made to the old shareholders. A new Board was created, through which Eaton was able to control the Company. The original capital was increased at different times between 1923 and June, 1925, when it stood at £20,000. The qualification fee for a Director was £50; but a curious feature was that no one was qualified by payment of money, although some had certain shares given to them.

Method of Recoupment of Money Expended.

Housing accommodation was provided for the Company in London with other concerns—for example, the Electricity Finance and Development Corporation and the Lighting and Power Finance Corporation—which had to some extent Directors in common, and were also controlled by Eaton. In June, 1923, resolutions were passed creating and issuing £5000 7½ p.ct. first mortgage debentures to Mr. Royce or his nominees, in satisfaction of the Company's indebtedness to that gentleman "in respect of his account for discharging the Company's liabilities to the voluntary liquidator and his disbursements;" and issuing 4990 preference shares of £1 each in exchange for the issued capital of £3990. Seeing that the old shares had been acquired at 3s. 5d. in the pound, or about £680, Col. Eaton or Mr. Royce took over the new issue of debentures and shares to the extent of nearly £10,000 in consideration of having paid £1400 for the discharge of the liabilities of the old Company to its creditors and shareholders. The Official Receiver says the people who, by resolution, made this magnificent gift to Mr. Royce for the trouble he had taken were not qualified to pass any resolution at the meeting of shareholders; they held no shares in the Company, and were merely employees and nominees of Eaton. The whole transaction was most irregular; and the effect was to place a hugely fictitious value on the original share capital.

Circulation of Prospectuses.

The next move was to send out several thousand prospectuses to the public—the names and addresses being obtained from lists of investors in other public companies. The first prospectus brought applications for £2890 debentures and £1717 preference shares; the purchase consideration of approximately £4315 was received direct by the Electricity Finance and Development Corporation, and became available to Eaton and for other schemes and companies in which he was interested.

Public Credulity—Shilling Shares at £1 each.

Another prospectus brought in applications for £3286 debentures, £4730 preference shares, and for 1525 ordinary shares of 1s. each. The latter shares were issued at a premium—first of 1s., later of 4s., and ultimately were offered at £1 each. This led the Official Receiver to observe: "The wider you open your mouth, and the bigger price you fix, the greater impression you may create in certain minds that the goods offered are very valuable. It is quite likely that these ordinary shares reached that high price by reason of the Company asking for a premium at the outset. The profits likely to be made by this concern could never justify any of its ordinary share capital being offered at a premium." Other prospectuses and issues of capital were made. In some instances applications were received for debentures and shares in excess of the total issue. The "surplus" purchase money was paid over to the Electricity Finance and Development Corporation, in order that it might be returned, while the excess debenture applicants were asked to take preference shares in place of debentures. A number of applicants agreed to exchange; but the balance of the surplus money (£1282) was handed over to the Electricity Finance and Development Corporation, and used for that Company's purposes.

Position of Subscribers of Capital.

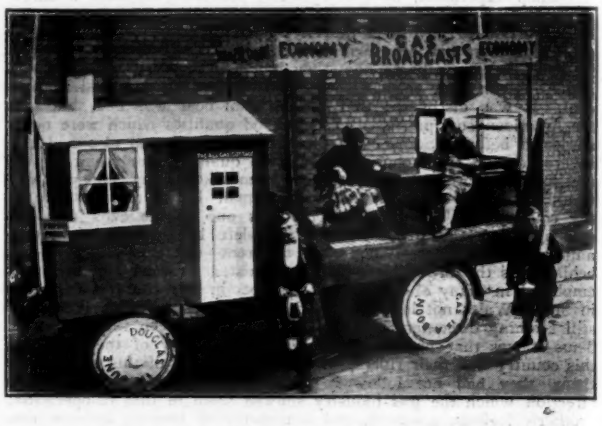
The debenture holders are not in possession, but have left the Official Receiver to look after the property and realize it for them. The works are being carried on with a view to obtain a purchaser for the property as a going concern. There is a debenture issue to provide for to the extent of £5000, which, with other liabilities, make a total indebtedness of £8893 to creditors. The assets will not realize sufficient to discharge the debentures; consequently no return whatever can be made to the unsecured creditors, or to the holders of the 16,000 preference and 683 ordinary shares. There is to be the closest investigation into all the transactions; and in due course the facts will be reported to the Court by the Official Receiver. He believes the Company was one of a group of thirty concerns, all of which are under the same control, and three of which are being wound up in his department.

"Directors," and "A Terrible Mess."

The Official Receiver asked Mr. *Wilfrid Burton*, a Director, why he concurred in the issue of shares and debentures in excess of the Company's holding. His reply was that he had no idea that was the case when he signed the shares. When he learned the facts, "to say he was in a disturbed state of mind, was a very mild way of putting it." Later he admitted that he did what he was told by Col. Eaton. He was now Director of one or two of Eaton's companies. But fees were not coming his way; he was not taking any active part in Eaton's affairs, or receiving any consideration from that gentleman. Whereupon the Official Receiver remarked: "It is people like you that cause the mischief which I shall have to investigate. But for you and directors like you, Col. Eaton and his friends could not have carried out their plans by which members of the public have been victimized. You can only say that you were so much in Eaton's hands that you signed anything he put before you. I warn you that you have got yourself into a terrible mess, and I hope it will be a lesson, because you do not know where these acts may lead you and your co-Directors. It is a very nasty story I have had to tell to-day, and but for you and your friends, it would not have had to be told."

AN INGENIOUS DISPLAY AT DOUGLAS.

At a recent carnival held in Douglas, the Douglas Gas Light Company (of which undertaking Mr. A. R. Bisset is Engineer and General Manager) were awarded first prize for a most effective tableau, two photographs of which we reproduce. The structure illustrated is one of the Company's steam wagons transformed into a house—an exhibit which was highly commended by the local Press.



Reduction at Bewdley.—The Bewdley Gas Company have decided to reduce the price of gas by 6d. per 1000 c.ft., as from the June meter readings.

Royal Meals in New Zealand.—During the journeys of the Duke of York in the South Island, New Zealand, recently, he was served with meals that were cooked on the train in a "New World" gas cooker, which was supplied by the Christchurch Gas Company.

Reduction in Price at Bradford.—The Bradford Corporation Gas Committee decided last week to recommend a reduction in the price of gas, to date from the meter readings for the period ending June 30, by 5d. per 1000 c.ft., bringing the charge down to 4s. 2d. for domestic use and 3s. 7d. for industrial purposes.

Devonport Gas-Works Extensions.—Mr. G. Ewart Rhodes, of the Ministry of Health, recently held an inquiry at Plymouth into the application of the Corporation for sanction to borrow £26,530 for the purpose of the gas undertaking. The Gas Engineer (Mr. R. J. Bradshaw) said the proposed works were necessary in order to meet an anticipated demand for gas. The allocation of the loan was as follows: £21,850 for a new retort bench, £380 for diversion of the telpher track, £2800 for a new stoking machine, and £1500 for dismantling the old retort bench and making foundations and connections. The Town Clerk (Mr. R. J. Fittall) asked that sanction for the loan should be given at an early date, as it was desired to complete the work in time for the heavy demand expected next winter.

MANCHESTER CORPORATION GAS SPECIAL ORDER.

Board of Trade Inquiry.

Mr. J. F. RONCA, Director of Gas Administration at the Board of Trade, held an inquiry on Monday and Tuesday, June 27 and 28, into an application by the Manchester Corporation for a Special Order under section 10 of the Gas Regulation Act. The purpose of the Order is to empower the Corporation from time to time, with the sanction of the Ministry of Health, to borrow on the security of the city rates such further sums as may be necessary for the purposes of the gas undertaking, including the provision of working capital.

The Corporation were represented by Mr. W. E. Tyldesley Jones, K.C., and Mr. Jacques Abady. There was opposition by the Urban District Councils of Stretford, Droylsden, Audenshaw, and Cheadle and Gatley, whose purpose was to secure the abolition of the differential price charged by the Manchester Corporation to consumers beyond the city boundary, who include consumers within the four districts named. They were represented by Mr. F. J. Wrottesley, K.C.

Mr. TYLDESLEY JONES, K.C., dealing with the financial position, said that in 1893 the Corporation were empowered to borrow £500,000 for the purposes of the gas undertaking, and since then the borrowing powers had been increased to £3,000,000. Sanctions had been obtained from the local Government Board to borrow the whole of the £3,000,000; and the Corporation had borrowed up to date £2,963,897. Thus, there was an amount of £36,103 still to be raised. The amount actually spent, however, was £2,969,167, so that they had spent nearly £5300 beyond the amount raised by loan. This extra amount had been obtained, he supposed, by overdraft from the bank or by using other funds of the Corporation. Actually, therefore, the real expenditure was short of the £3,000,000, for which sanctions had been obtained, to the extent of £30,833. That amount, however, was covered by sanctions for specific purposes, such as works extensions, water-tube boilers, and things of that sort, and was not available for such purposes as mains and services, meters, cookers, and fires. The Corporation had to spend each year something in the neighbourhood of £80,000 on mains and services, meters, cookers, and fires, and they had no unexercised powers to borrow money for carrying on the ordinary work of the undertaking. Hence the necessity for the present Order, the form of which was the common one.

Commenting upon the opposition, he said that the Manchester Corporation, in addition to supplying gas in the areas or parts of the areas of the four opposing authorities, also supplied in three other districts—namely, the Urban District of Failsworth, the Parish of Little Moss in the Rural District of Limehurst, and the Parishes of Northenden and North Etchells, in the Bucklow Rural District. Thus, out of seven local authorities, only four were opposing. The point which the opponents raised, however, was not an objection to the present Order at all. They were not objecting to the Corporation borrowing money for the conduct of the undertaking, and, indeed, it would be unreasonable if they did. They were taking the present opportunity of trying to get a little bit more than they had obtained on previous occasions, and were suggesting to the Board of Trade that, now the Corporation had applied for an Order, the Board should make them reduce the prices charged in the districts outside the City of Manchester. His first submission was that the opponents were not entitled to be heard at all, because their objection was not an objection made with respect to the draft Order, but was one made with respect to the Corporation's existing Acts and Orders. There was one point, however, in the objection which would have to be discussed, because the objectors did ask that the Corporation should not be given an unlimited power to borrow, subject only to the sanction of the Minister of Health.

The maximum price which the Corporation were empowered to charge for gas was previously 5s. per 1000 c.ft., but was now altered to 13·3d. per therm, and the declared calorific value was 450 B.Th.U. In common with other gas undertakings the Corporation had had to raise their prices as the result of the coal strike, and they were now applying a scale of charges which came into operation in December, 1926, by which the prices varied immensely with the amount of gas consumed. Within the city the price varied from 11·56d. per therm for lighting and domestic consumers whose consumption was under 90 therms per quarter, to 10·22d. per therm when the consumption reached 22,500 therms and upwards. The price for manufacturing, power, and cooking for trade purposes varied from 10·44d. per therm, in the case where the consumption was below 4500 therms, to 9·33d. where the consumption was 22,500 therms and upwards. The prices beyond the city boundary varied from 12·22d. to 10·89d. for lighting and domestic purposes, and from 11·11d. to 10d. for manufacturing, &c., so that a difference of 3d. per 1000 c.ft. was maintained as between the prices charged within and without the city. These prices were all subject to a discount of ¼d. per therm for payment within 28 days. This scale represented an increase of 10d. per 1000 c.ft. due to the strike, and that was to be reduced by 7d. as from the end of September next. Further, the prices were inclusive of meters and cookers, for which the Corporation made no separate charge.

In addition to the increased cost of coal due to the strike, there was another matter which had affected costs. In 1921 the Corporation had obtained powers to erect new gas-works in the parishes of Partington and Caddington. The construction of those works was not yet complete, and they had to pay interest and sinking fund charges on the whole of the money raised in respect of them, while at the same time they were deriving no advantage from those works. A considerable amount of money had to be paid annually out of revenue to meet those charges, and it had to be included in the price of gas, because there was no provision to capitalize interest or to suspend sinking fund.

At this point Counsel asked whether it was the practice of the Director, when it was submitted that objectors should not be heard, to proceed with the hearing of evidence or to give a ruling.

Mr. RONCA said he would hear the evidence.

COUNSEL then discussed at some length the proceedings in Parliament in 1921 on the Bill which the Corporation were then promoting, in the course of which proceedings a good deal of discussion was directed to the questions of applying profits from the gas undertaking to relief of rates, and of charging a differential price to consumers outside the City of Manchester. Two of the purposes of the Bill were to authorize the construction of the new gas-works in the parishes of Partington and Caddington, and to confirm and give effect to an agreement with the Stretford Gas Company to purchase the gas undertaking of the Company. The Manchester Corporation were supplying then, as now, in part of the Urban District of Stretford. The remainder of that district was supplied by the Stretford Gas Company, who also supplied in the Urban Districts of Urmston, Ashton-upon-Mersey, and Sale, and in parts of the Rural Districts of Barton-upon-Irwell and Bucklow. The Bill was opposed by all the local authorities mentioned, who strongly objected to the purchase by the Corporation of the Stretford undertaking.

For a number of years prior to 1921 the Manchester Corporation had made large appropriations out of the profits on the gas undertaking to the relief of rates. In many years the amount so appropriated was £50,000, and in some years as much as £60,000. In 1920, however, the City Council had passed a resolution to the effect that the gas undertaking and, he believed, other undertakings should be carried on without making profits. It was true, of course, that this resolution could have been rescinded at a later date; but in the course of the Parliamentary proceedings on the 1921 Bill the Corporation had conceded the insertion of a clause providing that there should be no appropriations of profits of the gas undertaking to relief of rates. They had maintained, however, that they should still have power to charge a differential price to consumers outside the city; but eventually they had made a concession, which was that if they were allowed to purchase the Stretford undertaking they would agree to charge the same price to consumers within the area supplied by the Company, and to those within that part of Stretford which was in the Corporation's then existing limits, as were charged in Manchester. The Bill, as passed, however, confirmed the agreement for the purchase of the Company's undertaking by the Corporation, but provided that if the local authorities in the area supplied by the Company promoted a Bill in the next session of Parliament to constitute themselves a Joint Board and to purchase the Company's undertaking from the Corporation, the Corporation should not oppose. That course was followed, and the Board had purchased the Company's undertaking from the Corporation. The concession previously made by the Corporation, however, not to charge a differential price in the Company's area, was conditional upon the Corporation retaining the Company's undertaking, so that, having sold this, they were still empowered to charge a differential price in their area outside the city. Thus, the whole position of the Corporation so far as gas charges and profits were concerned had been already reviewed by Parliament.

The local authorities who were objecting to the present Order, with the exception of the Stretford Urban District Council, were not parties to the 1921 agreement, but since 1921 they had all had the advantage of the provision that the Corporation should not apply profits of the gas undertaking to the relief of rates. Now they were asking for a little more, and he would resist it to the utmost. Stretford, he suggested, were rather going back on an agreement made in 1921. He did not say for a moment that an agreement was necessarily made for all time; it might be that in the course of time, owing to change of circumstances, a local authority would have a right to say that they should not be bound by it, but he submitted that in this case the circumstances were not such as to justify any departure. The present objectors, as well as Stretford, had a right to oppose the 1921 Bill, but had not done so. The Corporation had obtained their Bill; they had spent large sums of money, at the risk of the ratepayers of Manchester, on the strength of it, and the local authorities to whom he referred, though they were not parties to the 1921 settlement, were getting the benefit of it. It would be unjust to take from the Corporation their right to charge a differential price.

The only point in the objectors' petition which had reference to the present Order was that the Board of Trade should not give the Corporation unlimited borrowing powers. The Corporation, however, did not ask for unlimited powers, because borrowing was to be subject to the sanction of the Ministry of Health.

Mr. *F. P. Smith* (Financial Controller to the Gas Department of the Manchester Corporation) then gave evidence to prove the need for the borrowing powers asked for. It was mainly corroborative of Counsel's opening statement, and he emphasized that for the purpose of the normal extensions of mains, and provision of services, meters, cookers, and fires, for which purpose the Corporation were spending at the rate of something like £100,000 a year, they had no available borrowing powers.

A number of questions were put by Mr. F. J. WROTTESLEY, K.C. (on behalf of the objectors), who pointed out that in the Bill promoted by the Corporation in Parliament this year they had followed the common practice, in connection with their water undertaking, in that they had asked Parliament for further borrowing powers; and if they had followed the same course with regard to further borrowing powers for the gas undertaking, the objectors to the present Order could have raised their objections in Parliament. He sought the admission from witness, therefore, that the present Order was promoted with a view to avoiding discussion in Parliament.

Witness replied that he assumed the Corporation had adopted the normal procedure in this case.

Another matter to which COUNSEL referred was that it was the

practice of Parliament to grant power to borrow money sufficient only to carry an undertaking over a limited period, and he asked whether witness had been consulted as to whether it was desirable to ask for borrowing powers in the Corporation's Bill.

Witness replied that he had not.

COUNSEL, examining the accounts of the Gas Department of the Corporation, pointed out that the total loans raised amounted to £5,303,937, of which nearly £3,000,000 had been paid off. Thus the undertaking was becoming debt-free, and consumers, whether inside or outside Manchester, had been buying the undertaking for the Corporation, in the course of paying for their gas. The inhabitants of Droylsden, Stretford, Audenshaw, and Cheadle and Gatley had been contributing towards the purchase of the gas-works, but not for themselves. He pressed witness to admit that the works were being bought for the Corporation.

Witness replied that they were being bought for the gas community, who were sharing the economic results of the liquidation of debt.

Mr. RONCA remarked that the question was a simple one.

Witness then made the admission which Counsel sought.

COUNSEL, in the course of further discussion, pointed out that the consumers in the outside districts, in helping to pay-off the sum of nearly £3,000,000, were in a different position from that of consumers supplied by a company, because a company was not allowed to pay-off capital out of profits, so that this amount would not have to be found. Though the consumers outside the city had given so much help, the Corporation proposed to continue charging them an additional price for their gas.

Witness pointed out that Counsel had not taken into account all the factors which entered into the situation.

COUNSEL then referred to the considerable appropriations which had been made from net profit since 1920 to extensions of works, and said that the amounts so appropriated in the seven years from 1921 to 1927 inclusive were £23,000, £14,000, £40,000, £25,000, £23,000, £27,000, and £23,000 respectively, though in the latter year there had been a loss on the undertaking.

Witness denied that there had been a loss in trading, but said that the undertaking did not make sufficient to pay the necessary amount on sinking fund. He admitted that the deficit would be carried forward, and that the price of gas would be fixed to meet that deficit.

COUNSEL referred, as an example of the unfairness of the differential, to the position of a consumer living just outside the Droylsden Gas-Works, who would have to pay 12·22d. per therm, or 4s. 7d. per 1000 c.ft., for his gas, whereas a consumer in Manchester who was supplied with gas made at the Droylsden Works, and which had to be conveyed over a distance of at least a mile, would pay 11·56d. per therm, or 4s. 4d. per 1000 c.ft.

Witness replied that there were many factors to be taken into consideration in this respect. For instance, the consumers in the outside areas ran no risks; and no liability would fall upon them if gas supply were superseded.

COUNSEL asked what risk there was in the case of an undertaking worth approximately 5½ million pounds, and with a loan debt of only 2½ millions.

Witness, in reply to this, again referred to the possibility of gas being superseded. He believed that the risk was such that it ought to be assessed in money and charged to the consumers.

COUNSEL, in the subsequent discussion on this point, reminded him that there had been a steady increase in the demand for gas in the past; that in 1921, when the Corporation had sought power to erect the works at Partington, they forecasted an increase for the future; that the forecast then made for 1925 had been exceeded; and that the increase was still apparent.

Witness agreed it was reasonable to assume that the consumption would continue to increase. He had every confidence that gas would remain; but it was necessary to be cautious.

In reply to further questions, he said he believed the Partington Works would come into use next year.

COUNSEL referred to another anomaly. Whereas a consumer in Stretford had to pay 12·2d. per therm, a consumer in Chorlton-cum-Hardy, which was beyond Stretford, paid 11·56d. per therm, because Chorlton-cum-Hardy was part of the city area. Therefore, it was not the extra cost of supply which justified the extra charge in Stretford. Again, the price charged by the Stretford and District Gas Board was less than that charged by the Manchester Corporation to its consumers in Manchester. The Corporation charged 11·56d. per therm in Manchester, and 12·22d. per therm in the outside area, including part of Stretford, whereas the price charged by the Board in Stretford was 11·25d., and this was to be reduced after the June quarter to 10·25d. per therm.

Witness pointed out that, after September, the price in Manchester would be reduced.

COUNSEL, with regard to the point made by the Corporation that some of the outside districts whom they supplied were not objecting to the present Order, said that the objectors represented over 90 p.ct. of the consumers affected by the differential charge, on the basis of consumption. In 1926 the amount of gas sold by the Corporation outside the city was 457 million c.ft., of which 420 milion c.ft. was sold to consumers in the areas of the four objectors.

Witness, in re-examination, said he had been given no authority to express the Corporation's views with regard to the justification of the differential charge, and that the views he had expressed were his own personal views.

COUNSEL: Is it seriously suggested that this witness has no instructions?

Witness, re-examined on the position as between a company and a local authority undertaking, said that, though a company was not obliged to provide a sinking fund for redemption of capital, it had to provide a depreciation fund out of revenue. Further, a local authority, on the security of the rates, could raise money more cheaply than a company. Referring to the Droylsden Works, he said that if they were carried on as a separate undertaking they could not produce gas so cheaply as the Corporation could produce it. With regard to the suggestion that the Corporation could have included clauses in their 1927 Bill to empower them to borrow money in respect of the gas undertaking, instead of promoting an Order, he said that the application for the present Order was being prepared twelve months before the Bill was thought of.

This concluded the case for the Corporation.

Mr. *W. M. Carr* (Engineer and General Manager of the Stretford and District Gas Board), who acted as adviser to the objectors, then gave evidence on their behalf. He said they had intended to raise their objections in Parliament in connection with a Bill promoted by the Corporation in 1924, but the Corporation had withdrawn the clauses to which objection was to be taken, so that discussion in Parliament was avoided. Continuing, he said that the Corporation's maximum price was 5s. per 1000 c.ft., and they could charge in the outside districts 8d. more than within the city. Comparing the prices charged by the Board in Stretford with those charged by the Corporation in Manchester, he observed that generally they had been similar. Discussing the differential, he remarked that the geographical positions of Droylsden, Audenshaw, and Stretford were such that it must be cheaper for the Corporation to supply in those districts than in many other parts of their limits of supply which were being supplied at a lower rate. Dealing with the principle of the application of profits to relief of rates, he said that all progressive Corporations to-day were admitting that it was not a fair one.

Mr. TYLDESLEY JONES said he did not admit that; neither was it in accordance with his experience.

Mr. WROTTESLEY commented that at any rate the Manchester Corporation had done so. Remarking upon the references made to the possible supersession of gas, he said the fact that there was ample room for gas supply was borne out in the area supplied by the Board, because, though electricity was very cheap there, it had in no way interfered with the development of the Board's undertaking. In fact, this development had been extraordinarily marked.

Mr. ABADY, for the Corporation, said that, if it would shorten matters, he was prepared to admit that most gas undertakings showed an increase in consumption year by year.

Witness said that in the last six years the increase in the business of the Board's undertaking had been equal to the increase which had taken place in the previous fifteen years, due to the fact that the use of gas was extending. In a table which he put forward, showing the application of revenue and loan money to capital purposes by the Corporation for the year ended March 31, 1926, he showed that the total capital expended was £324,736. The sum applied to capital purposes from revenue—*i.e.*, sinking fund and profits—amounted to £177,178, which was equivalent to a charge of 6·06d. per 1000 c.ft., or 1·35d. per therm. There had been a 150 p.ct. increase in the outstanding loan debt between 1920 and 1925, whereas the increase in gas consumption was about 25 p.ct. The position of the consumer in the outside area was that the charges for the purpose of gas-works became higher and higher, but those works were not for himself. On top of that he was charged an extra 3d. per 1000 c.ft.

It could not be said that the Partington Works were necessary for the supply to the outside districts. One of the main reasons for those works was that it would enable the Corporation to close-down two existing works, and so remove nuisance from Manchester to an outside area.

Another statement prepared by witness showed that the interest and sinking fund charges per 1000 c.ft. of gas sold by the Corporation in 1910, 1915, 1920, and 1925 were respectively 5·23d., 4·41d., 4·25d., and 7·57d. The equivalent charges per therm were 1·16d., 0·98d., 0·94d., and 1·68d. These were high. He also produced a statement of gas sold and the revenue from gas sales in various years, which showed that the average price received per 1000 c.ft. for gas outside the city exceeded that received within the city by 1·03d. in 1923; 3·7d. in 1924; 3·83d. in 1925; and 4·18d. in 1926. This showed that the large consumers, who were getting the advantage of lower prices by reason of their large demands, were mainly within the city. If the increased charge made to consumers outside the city were dispensed with, the whole of the consumers would have to pay 0·05d. per therm more than the price charged to-day to consumers inside the city.

Mr. ABADY, cross-examining, said that no consumer outside the city paid more than 3d. per 1000 c.ft. above the price charged to the consumer inside, in like circumstances. One reason for the increase in the extra price received from consumers outside the city was that the incidence of the different scales of charges as between the inside and outside areas had altered, and another was that the proportion of the total gas sold which was supplied outside, in relation to the proportion supplied inside, had altered.

Witness said there was still another reason, which was that in 1923, when the Corporation owned the Stretford undertaking, they had charged the lower rate in the part of Stretford which was now supplied at the higher rate.

Mr. ABADY, dealing with the suggestion that the interest and sinking fund charges per therm of gas sold by the Corporation were high, ascertained that the interest and sinking fund charges on the Stretford undertaking represented just about 3d. per therm in 1925, so that the charges at Manchester were smaller than those at Stretford, notwithstanding that the former had not finished expending capital.

Witness replied that there was no comparison between the two undertakings from the point of view of size, and that the loan charges would be very much greater at Manchester when they had finished expending capital. He agreed with Mr. Abady, however, that the interest and sinking fund charges at Manchester were at present little more than half those at Stretford, though they included the expenditure of a good deal of capital which was yet unproductive.

Mr. ABADY also pointed out that the ratepayers in the districts outside Manchester which were supplied by the Corporation could not be called upon to share any deficiency on the Manchester undertaking.

Witness, questioned with regard to the differential charge, expressed the view that where such a charge was proved to be justified

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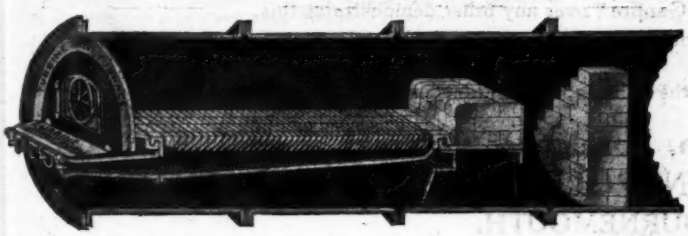

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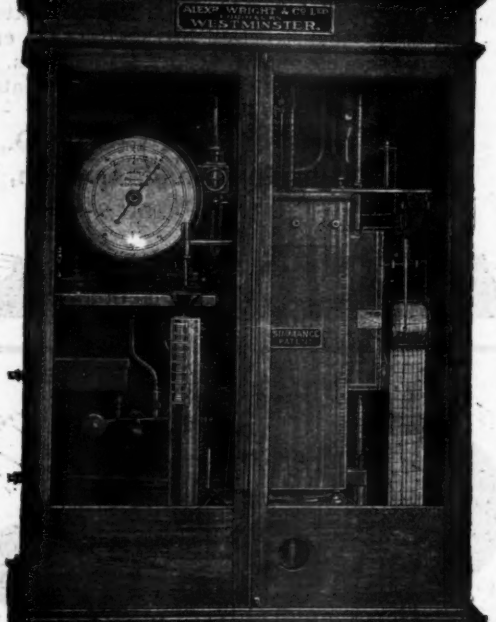

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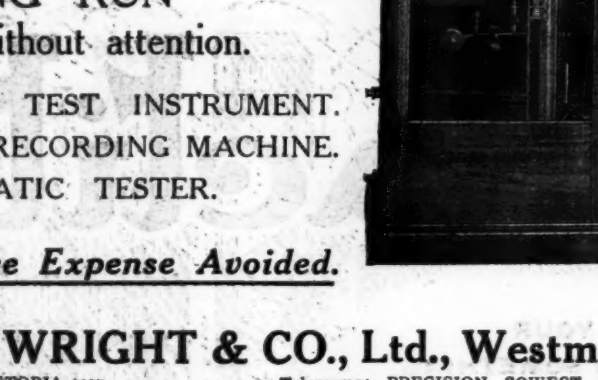

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by reason of the extra cost of giving the supply, it should be limited to the amount of the extra cost.

Mr. ABADY, with regard to the suggestion that the Corporation had withdrawn clauses from their Bill in 1924, in order to avoid the opposition of the authorities who were now objecting, said that by that Bill the Corporation sought power to supply in Partington and Caddington, and were opposed by the Altrincham Gas Company, who had powers to supply in that district. They were able, however, to obtain their powers by agreement, and by withdrawing the clauses they did not incur the opposition of the Altrincham Gas Company.

The inquiry was adjourned until Tuesday, June 28.

STOKE-ON-TRENT GAS DEPARTMENT.

Annual Outing.

The workpeople and staff of the Stoke-on-Trent Gas Department, accompanied by members of the Gas Committee, visited Llandudno on June 20, on the occasion of the gas-works annual outing; and a very pleasant day was spent.

At the luncheon which took place,

Alderman MITCHELL said it was a good thing to have these annual outings, which cemented brotherly feeling between workmen and officials, and between officials and the Committee. He referred to the trying circumstances which had marked the past year, and complimented the Engineer and the employees upon the way the gas undertaking had been maintained during that period. He specially welcomed Alderman Goddard, Chairman of the Finance Committee, and Mr. Henry Woodall, who lived at Llandudno, and was a member of a family closely associated with the life of North Staffordshire, he having occupied the position of Manager of the gas-works at Longton and at Burslem in succession to his brother, Mr. William Woodall, who afterwards became M.P. for Burslem. Another brother was the late Sir Corbet Woodall, who was Governor of the Gas Light and Coke Company, while Mr. Henry Woodall's nephew was at the present time Chairman of the British Gas Light Company.

Alderman GODDARD mentioned his long connection as Chairman of the Finance Committee for the City of Stoke-on-Trent, and referred to the scheme for the concentration of the gas supply at one centre at present proceeding at the Etruria Works. He believed this would ultimately cheapen the gas supply to the consumers of the whole area.

Mr. WOODALL said that sixty years ago he was Manager of the gas-works at Longton, and afterwards at Longport. If it had not been for his conduct sixty years ago, the company present would not have been enjoying now the privileges they were enjoying. The Court of Directors he had at that time were most delightful men, and so trusted him that they left everything to him; and perhaps he became too autocratic in consequence. The Directors only met once in three months; and their meetings rarely occupied an hour. He remembered on one occasion the Chairman said, "Isn't it time we had finished; we have been here an hour already?" The fact was that he (Mr. Woodall) was the Company, and in this position he was approached by the Mayor of Burslem at that time, who asked whether he would have any objection to part with the undertaking. He replied, "No, at a price." The Mayor asked what that price would be; and without any more delay Mr. Woodall said £80,000. The capital at that time was £32,000. Though this price rather staggered the Mayor, Mr. Woodall refused to move, and said, "£80,000 or no sale." Two or three months after that he was appointed to Leeds, but the price of £80,000 held good. That was £80,000 and £4000 lying in reserve at the time. Of course, he had a meeting of the Directors, and told them he had received an offer for the undertaking. His brother William was a member of the Council at that time. So that was every bit as good a sale as the Corporation of Stoke-on-Trent made with the British, and he said they were there to-day by his good offices. If he had continued to stay at Burslem, the present officials would not have been there that day.

Mr. A. MACKAY, Engineer and Manager of the Stoke-on-Trent Gas Department, after referring to the recent death of his Deputy, Mr. R. Surtees, said that it gave him great pleasure to welcome Mr. Henry Woodall. To everyone connected with the gas industry the name of Woodall had been a household word for approaching 100 years. He referred to the fact that Mr. Henry Woodall was the uncle of the present Chairman of the British Gas Light Company, Mr. Henry Woodall, and he could not speak too highly of the latter in connection with the negotiations for the purchase of the Company's works. He was one of the rare business men who were capable of mixing sentiment with business, and he was glad to know Mr. Woodall had not been so severe with his price as their friend there had been with the sale of the Burslem Works. Mr. Woodall's figure worked out at about £650 per million. His relative at Burslem had got over £1200 per million; and if it were now considered that the Gas Department's capital was too high, they should blame Mr. Woodall for the sale of the Burslem undertaking some 70 years ago. [Laughter.]

Compensation Case at Preston.

At the Preston County Court, on June 28, Judge Bradley gave judgment for respondents in a compensation case, in which the applicant was Henry Waite, horse driver, and respondents the Preston Gas Company. Counsel said that applicant entered respondents service in 1916. In January, 1924, he caught his foot in a hole, and fractured his right ankle. He was given light work. In March last there was a ballot as to who should be discharged, and he drew a "loser." Through the accident, applicant was unable to get work. It was contended that Waite had completely recovered from the accident. His Honour found that applicant had recovered from the accident and was not suffering incapacity.

COAL TRADE REPORTS.

From Our Own Correspondents.

NORTH-EAST COAST.

There are no signs of improvement, and a very dull week has been experienced in the market. There seems to be no demand for any class of coal, and keen competition for any odd orders that come along generally results in price cutting. Nominal quotations for forward business remain unchanged, since collieries see no prospect of being able to reduce costs any further, and current prices already show a loss in a great many cases. Shortage of trade is causing much idle time, and this, of course, has a serious effect upon production costs.

Wear Special gas makes quote 16s. 6d., f.o.b., and best qualities are 16s. to 16s. 6d. Seconds are nominally 14s. to 14s. 6d. All qualities are freely on offer, and these prices can be discounted for prompt shipment. Durham unscreened coking is in poor demand, and weak at 14s. to 14s. 6d. Ordinary bunkers are at the same price, and better sorts quote 15s. Northumberlands are weak, and short of trade at even 14s. 6d. for best screened sorts.

Gas coke is fairly steady, and is quoted at 19s. to 19s. 6d. f.o.b. for shipment.

YORKSHIRE AND LANCASHIRE.

Gas coal contracts in Yorkshire and Lancashire are being fixed at low figures. It is possible that prices will tend to harden within another month or so.

Industries are moving slowly, with no great sign of recovering their pre-stoppage basis.

Steam fuels of all descriptions for home consumption are quoted at low figures, probably as low as they will get.

There appear to be more inquiries from abroad, although exporters report that there is no visible sign of increased business.

The house coal trade has been steady during the past week; but this has not made any difference in regard to the reduced working hours at the pit.

The following are the Humber bunker and export prices, f.o.b. usual shipping ports: South Yorkshire—Hards, Association, 15s. 6d.; screened gas coal, 15s. 6d. to 16s.; washed trebles, 16s. 6d. to 17s.; washed doubles, 16s. to 16s. 6d.; washed singles, 15s. to 15s. 6d.; washed smalls, 13s. 9d. to 14s.; rough slack, 12s. 3d. to 12s. 6d.; smithy peas, 17s. to 19s. per ton. West Yorkshire—Hartley's, f.o.b. Goole, 14s. 6d. to 15s.; screened gas coal, 15s. to 16s.; washed trebles, 15s. to 16s.; washed doubles, 15s. to 16s.; washed singles, 15s.; washed smalls, 13s. 6d. to 14s.; unwashed trebles, 14s. 9d. to 15s. 6d.; unwashed doubles, 14s. 6d. to 15s.; rough slack, 12s. 6d. to 13s.; coking smalls, 12s. 6d. to 13s. per ton. Derbyshire and Nottinghamshire—Top hards, 16s. to 19s.; washed doubles, 15s. 6d. to 16s.; washed singles, 15s. 6d. to 16s.; washed smalls, 14s. to 14s. 6d.; unwashed doubles, 15s. to 16s.; rough slack, 13s. per ton. Yorkshire, Derbyshire, and Nottinghamshire—Screened steam coal, 14s. 6d. to 15s.; gas coke, 18s. to 20s.; furnace coke, 18s. 6d. to 20s. per ton.

The trade in industrial fuels in Lancashire shows little improvement. Average prices in wagons at the pit are: Best Lancashire house, 32s. to 33s.; Lancashire second, 29s. to 30s.; common, 19s. to 21s.; kitchen, 22s. to 24s.; Yorkshire selected house, 30s. to 32s.; Yorkshire house, 26s. to 28s.; common, 18s. to 19s.; washed doubles, 15s. to 16s.; washed singles, 14s. to 15s.; rough slack, 11s. to 13s. per ton.

MIDLANDS.

House coal suitable for stacking has been in rather better demand by town and country customers. The London trade, however, remains inert. Industrial qualities are selling neither better nor worse. The redress of price inequalities has resulted in a more proportionate distribution of business. At Cannock Chase, where endeavours had been made to hold up values after the position had been surrendered in neighbouring coalfields, prices have been brought into line, and employment has improved. Railway requirements are being met in all the districts now at about 15s. a ton. Slacks are absorbed practically up to the limits of supply; but the demand is too small to bring about any stringency. Very fine grades can be bought at 5s., and good nutty slacks at about 10s.

More annual contracts have been fixed up between collieries and gas undertakings. There is still a considerable number in negotiation, however. From 14s. 6d. to 14s. 9d. has been accepted; but some works managements think that by deferring the matter they may gain a further advantage.

Blast-furnace coke has got the turn again. The over-supply appears to have been corrected by reduction of output, not by expansion of buying—and the very low prices which were taken in order to get a quick market are no more heard of. From 13s. to 14s. at the ovens is now quoted for average qualities.

TRADE NOTES.

Sulphate of Ammonia Plant.

The Chemical Engineering and Wilton's Patent Furnace Company, Ltd., have received instructions from the Edinburgh Gas Department for a complete 12-ton per 24 hours unit for sulphate of ammonia, on the lines of the plant described in the "JOURNAL" for June 15, p. 686. It is to be of the latest Wilton type.

Price Reduction at Penzance.—The Penzance Gas Company have reduced the price of gas by 6d. per 1000 c.ft.

Torquay Gas Company's Issue of Stock.—The Directors of the Torquay and Paignton Gas Company have instructed Messrs. A. & W. Richards to offer for sale by tender £50,000 5 p.ct. preference stock (irredeemable); the minimum price of issue being £84 per £100, yielding at that price £5 19s. 1d. p.ct. Tenders should reach Messrs. Richards, at 37, Walbrook, E.C. 4, not later than 11 o'clock on Thursday, July 14.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

London, *July* 4.

There is little change to record in the values of tar products. Pitch is steady at 82s. 6d. to 85s. per ton.

Creosote is 8¾d. to 9d. per gallon.

Pure benzole is 1s. 7d. per gallon, and 95/160 solvent naphtha 1s. 5d. to 1s. 6d. per gallon. Pure toluole is in demand and is somewhat scarce. The value to-day is about 2s. per gallon.

Phenol is about 8d. per lb. in large drums and overcasks.

Tar Products in the Provinces.

July 4.

The average values of gas-works products during the week were: Gas-works tar, 59s. to 64s. Pitch—East Coast, 80s. to 82s. 6d. f.o.b. West Coast—Manchester, 75s. to 77s. 6d.; Liverpool, 77s. 6d. to 80s.; Clyde, 79s. to 81s. 6d. Benzole, 90 p.ct. North, 1s. 2d. to 1s. 3d.; crude, 65 p.ct. at 120° C., 10½d. to 10¾d., naked, at makers' works; 50-90 p.ct. naked, North, 1s. 3d. to 1s. 4d. Toluole, naked, North, 1s. 4d. to 1s. 5d. nominal. Coal-tar crude naphtha, in bulk, North, 7½d. to 8d. Solvent naphtha, naked, North, 11d. to 1s. 0½d. Heavy naphtha, North, 1s. to 1s. 1d. Creosote, in bulk, North, liquid, 7½d. to 7¾d.; salty, 7¾d. to 7⅞d.; Scotland, 7¾d. to 7¾d. Heavy oils, in bulk, North, 8½d. to 9¼d. Carbolic acid, 60 p.ct., 2s. 4d. prompt. Naphthalene, £11 to £14; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

CONTRACTS OPEN.

Coal.

The Clitheroe Corporation are inviting tenders for the supply of gas coal. [See advert. on p. 54.]

Tenders for the supply of coal are invited by the Colchester Gas Company. [See advert. on p. 54.]

General Stores, Lime, Castings, Paints, Oils, &c.

The Birkenhead Corporation are inviting tenders for general stores, &c. [See advert. on p. 54.]

Meters, &c.

Tenders are invited by the Birkenhead Corporation for the supply of gas meters, &c. [See advert. on p. 54.]

Oxide of Iron.

Tenders for oxide of iron purifying material are invited by:
City of Salford. [See advert. on p. 54.]
Birkenhead Corporation. [See advert. on p. 54.]

Pipes (Cast, Wrought, and Lead), Specials, and Fittings.

Tenders for the above are invited by the Corporation of Birkenhead. [See advert. on p. 54.]

Position of Gas Supply at Burnley.

Mr. J. Herbert Clegg, the Burnley Corporation Gas Engineer, has issued a special report on the position of supply and demand in respect to plant. There is being installed at Old Hall plant of a nominal capacity of 2,600,000 c.ft. of coal gas per day, and 800,000 c.ft. of water gas. The present plant at Parker Lane, he says, has had an extraordinary life, and is properly worn out. It would be inadvisable, he thinks, to go to the expense of re-setting the inclined retorts, and he says it is necessary to provide further gas-making plant within the next three years. Further, it is too costly to run two works, and it would be better to concentrate operations at one place; the saving being more than would cover the cost of interest and sinking fund on the new plants. He recommends the erection of a second unit equal in capacity to the present plant. The outside estimate of the cost is £130,000. Mr. Clegg suggests that, before finally deciding, the Gas Committee should wait until March, by which time he will be in a better position to advise with regard to the next installation of carbonizing plant. Some coke oven plants have been recently erected in gas-works, which he would like to observe, and further progress may have been made in total gasification plants. Further, they will be able to profit by the experience gained in the working of the present new plant, and one of the local collieries will be able to say whether they will instal bye-product plant from which there will be surplus gas. The Committee has given instructions to the Engineer to prepare a scheme for submission to the Ministry of Health by March 31, so that the Department will be ready to proceed with the erection of the plant, to be completed for gas making by the winter of 1929.

Loss at Rotherham.—The Rotherham Corporation Gas Department shows a deficit of £13,154 for the past year, owing to the coal dispute. In previous years the Department has made generous contributions to the relief of the rates. It was estimated originally that the loss would amount to £17,000.

Halesowen's Lower Charges.—The Halesowen Gas Company have decided to reduce the price of gas as follows: For lighting and domestic purposes to 10·9d. per therm; for power and manufacturing purposes—under 100,000 c.ft. per quarter 10·2d. per therm, over 100,000 c.ft. and under 300,000 c.ft. per quarter 9·6d. per therm, over 300,000 c.ft. 8·2d. per therm.

Gas Sales Increase at Thornton-le-Fylde.—The consumption of gas shows an increase of 7 p.ct. on the year; and despite the fact that coal cost £4500 more, the Department made a profit of £750 for the relief of rates. Gas charges were reduced by 4d. per 1000 c.ft., and large consumers were also put on a sliding-scale basis, to bring the general charge below 4s. per 1000 c.ft.

Co-Partnership Meeting at Brighton.

The sixth annual general meeting of the Co-Partnership Scheme of the Brighton and Hove General Gas Company was held in Hove Town Hall on June 27—Mr. A. M. Paddon (Chairman of Directors) presiding. The Chairman, moving the adoption of the accounts for the year ended Dec. 31, said that the co-partners' funds, representing investments in the Company's stock or allotments belonging to their proprietors and held by the Company on the 5 p.ct. basis amounted to £43,059. This was the result of six years' operation of the system. The largest amount now payable to a co-partner on retirement was already £70; and at the end of his full term of forty years' service, a co-partner might look to taking £1400 to £1500 into his retirement. Mr. Paddon also referred to the Sick and Benefit Fund, which had increased its membership, by 22, to 660, with accumulated funds totalling £2734, and to the Co-Partners' Savings Bank, which had increased the balance brought forward from £3747 to £4924.

Unauthorized Vendors.

Recently we mentioned the case of the unauthorized use of the name of Radiation, Ltd., by a street vendor in connection with a gas-cooker device. The Company have been informed of another instance, particulars of which are as follows: A man called at a house at Tooting Bec, saying that he was from the Radiation Gas "E.C." Company, of 84, Oxford Street, and offering for sale a plate called a "Triplex"—an attachment for enabling three vessels to be placed on one burner. The lady of the house paid him 5s., and was told that, if she did not like the attachment, she could return it within a couple of months, and get her money back. Finding the appliance was useless, she wrote to the address given for the return of her 5s., but, of course, was unsuccessful. Inquiries at 84, Oxford Street, showed that neither this man nor his supposed Company are known there. Needless to say, he has no authority from Radiation, Ltd., and gas consumers should be on the look-out for him in future.

Parkinson and W. & B. Cowan, Ltd.

In submitting the accounts for the year ended March 31, the Directors report that the income from the Company's Subsidiary and Associated Companies is substantially larger than in the previous year, and that there has been a considerable improvement in the trading results of the Company's Subsidiaries engaged in the gas meter industry, reducing materially the adverse balance resulting from the operations of that branch in the previous year, due to keen price competition, which is now less severe. This increase in the Company's revenue enables the Directors to recommend an increased final distribution for the year of 2 p.ct. on the ordinary shares as compared with that of recent years. After paying debenture interest and providing for depreciation of buildings, the net profit for the year is £77,717, to which is added the sum of £28,608, brought forward on April 1, 1926 (after paying a final dividend on ordinary shares for the previous year). Payment of preference dividend has absorbed (subject to tax) £21,863, and an interim dividend for six months on the ordinary shares, at the rate of 5 p.ct. per annum, has been paid, amounting (subject to tax) to £11,896, leaving a disposable balance of £72,565. Out of this balance the Directors recommend the payment of a final dividend on the ordinary shares for the year of 7½ p.ct. (less income-tax), making with the interim dividend a total dividend for the year of 10 p.ct., amounting to £28,552. They recommend also that there be carried to reserve fund £17,385, and that there be carried to next account £26,627. During the year the Company's Subsidiary, the Parkinson Stove Company, Ltd., made an issue of 200,000 £1 7 p.ct. cumulative preference shares, and consequently became a public company. In order to meet the increasing Australian demand for the products of the Parkinson Stove Company, Ltd., arrangements are in progress for the manufacture of that Company's goods in the Commonwealth, for which purpose the Parkinson Stove Company (Australia), Ltd., has been formed as a Subsidiary of that Company.

Watford Gas and Coke Company.—The recent issue of £30,000 "B" stock of this Company was considerably over-subscribed.

Profit at Buxton.—At a meeting of the Buxton Borough Council on June 29, the Gas Committee reported that for the year ended March 31 last there was a net profit on the gas undertaking of £3016. The Council resolved that £1666 be transferred to the reserve and renewals fund, and that the balance of £1350 be applied to the relief of rates.

Gas Exhibition at Dewsbury.—The Dewsbury Gas Department are at present holding an exhibition in which the following firms are exhibiting: General Gas Appliances, Ltd.; the Parkinson Stove Company, Ltd.; R. & A. Main, Ltd.; the Welsbach Light Company, Ltd.; Arden Hill & Co., Ltd.; Geo. Bray & Co., Ltd.; and Cannon Iron Foundries, Ltd. Miss L. Parkyn is in charge of the cookery demonstrations.

Price Reduced at Swadlincote.—It was reported at a recent meeting of the Swadlincote Urban Council that, though it had been a trying year, the gas-works, instead of showing a loss, had shown a small profit. The Gas Committee recommended that the price of gas be reduced immediately by 4½d. per 1000 c.ft., or 1d. per therm, and that a cash rebate be allowed on the slot meter collections. The recommendation was adopted.

The recent decision of the Bradford Corporation Gas Committee to renew simple hiring of domestic gas cooking and other appliances—a practice stopped during the war—is proving successful.

The Leeds Gas Committee recommend the City Council to approve the purchase, for £2000, of so much of the Calverley and Horsforth District Gas Company's undertaking as is situate within the City of Leeds and the Parish of Eccup.

STOCK MARKET REPORT.

CONSIDERABLE uneasiness prevailed on the Stock Exchange last week. The new account had opened with every indication of an improvement in business; but the circumstances which led up to the slump in British Controlled Oilfields shares, with its attendant far-reaching effect on other markets, caused an alarming diminution in the number of transactions. Moreover, a large amount of the business that was done was due to forced sales to meet the calls in respect of the "differences" in Oil shares. The talk of wholesale failures can, however, be ignored, and it is probable that prices will recover. Owing to the close of the half-year, Money was scarce; but in spite of the tightness, gilt-edged stocks remained firm. The position was relieved on Friday when funds, assisted by the interest and dividend disbursements totalling to nearly £40,000,000, became plentiful, and the week closed satisfactorily.

Colonials were quiet; but improvements were recorded in Indians, New South Wales, and New Zealand stocks. Industrials, but for the dramatic happenings, would have been better on the week.

In the Gas Market, conditions were normal. Gas Light 3¼ p.ct. maximum rose 1 point to 60-62, and the South Metropolitan ordinary ½ point to 100-102½. The Colombo and Primitiva shares were improved. On the other hand, Bristol ordinary was marked down 2 points to 86-87, and the Sheffield three stocks 1 point to 97-99, at the respective local exchanges. The Commercial Gas Company's Act received the Royal Assent on June 29 and becomes operative. The financial clauses are on the lines of the South Metropolitan Company's powers. The two stocks will henceforth be merged; and it will be permissible for the Company to distribute a dividend of 5 p.ct., *plus* a share in the surplus profits. At the present prices of the stocks they are a very attractive proposition.

The following transactions were recorded during the week:

On Monday, Bournemouth "B" 12⅜, British 108¾, 4 p.ct. debenture 75½, Gas Light and Coke 87½, 87⅞, 88, 88¼, 3½ p.ct. maximum 60½, 6 p.ct. Brentford debenture 101½, Imperial Continental 138½, 139½, Montevideo 91, Oriental 100, 101, Primitiva 15s. 1¼d., 15s. 4½d., 15s. 6d., South Metropolitan 101½, 102, Wandsworth, Wimbledon 5 p.ct. 102¾, 102⅞.

On Tuesday, Colombo 29s. 4½d., 29s. 10½d., Gas Light and Coke 87½, 87⅝, 87¾, 3-p.ct. debenture 58½, 58¾, Imperial Continental 138, Liverpool 7 p.ct. preference 103, Primitiva 15s. 4½d., 15s. 6d., 15s. 7½d., 15s. 9d., 4 p.ct. debenture (1911) 70, South Metropolitan 101½.

On Wednesday, Aldershot 4 p.ct. preference 69, Bombay 21s. 6d., Bournemouth 6 p.ct. preference 11⅛, Commercial 3 p.ct. debenture 58, 58½, Gas Light and Coke 88, 88⅛, 3½ p.ct. maximum 60⅝, 4 p.ct. preference 76½, 3 p.ct. debenture 58½, Imperial Continental 138½, Primitiva 15s. 7½d., 15s. 10¼d., Southampton 5 p.ct. maximum 75¾.

On Thursday, Bournemouth 6 p.ct. preference 11⅜, British 108, Cape Town 4½ p.ct. preference 6⅝, Commercial 4 p.ct. 88, Croydon sliding-scale 98½, maximum dividend 79½, Gas Light and Coke 87½, 87⅝, 87¾, 88, 3½ p.ct. 60, 61, 61½, Imperial Continental 138, Montevideo 90¾, Oriental 100½, 101, 101½, Primitiva 15s. 6d., 15s. 7½d., 15s. 9d., 15s. 10½d., South Metropolitan 101, 102, Southampton 76½, Tottenham "B" 94. Supplementary prices, Hertford original (10 p.ct. maximum) 14, 14½.

On Friday, Bombay 21s. 9d., 22s. 3d., British 106½, Commercial 4 p.ct. 88, Croydon sliding-scale 98, maximum dividend 79, European 6⅝, 6⅞, 6⅞, Gas Light and Coke 87½, 88, 88⅛, 4 p.ct. preference 76⅜, 77, 77¼, 77½, Imperial Continental 138, Oriental 101, Primitiva 15s. 10½d., 15s. 11¼d., 16s., 16s. 3d., Sheffield "C" 99, South Metropolitan 101½, Tottenham "B" 91½. Supplementary prices, Eastbourne 3½ p.ct. "B" 105⅞, Metropolitan (Melbourne) 9⅜, Reading 5 p.ct. 83⅛, 83¾, Sutton 105, Swansea 5 p.ct. 80½, 80⅝, Yorktown and Blackwater new 5 p.ct. preference 89.

The quick change in the monetary conditions at the close of the week was exceedingly welcome in Lombard Street. The large amount due to the Bank of England was repaid with ease, and fresh money was offered at from ¾ p.ct. down to 2½ p.ct. Discount quotations, however, remained unaltered, notwithstanding that the Treasury Bill rate—£4 6s. 5·65d. p.ct.—was a little below market expectations. The average was just over 3d. p.ct. above the previous week's rate.

In the Foreign Exchange Market there was considerable business in the Italian lira. Sales on London had a reactionary effect, and the rate declined to 87·70. The New York rate was slightly firmer at 4.85⅛⅜. Spanish pesetas recovered to 28.25; and the French and Belgian currencies remained unchanged at 124 and 34·94 respectively.

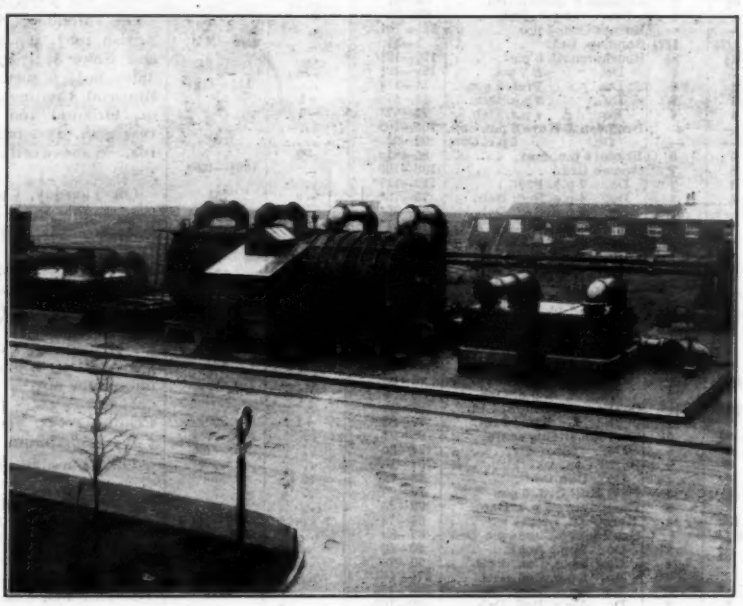
No Gold was available, and the price remained at 84s. 11½d. per oz. Silver was quiet, and the price was also unchanged at 26 1/16d. per oz.

The Bank Rate is 4½ p.ct., to which it was reduced from 5 p.ct. on April 21. Bankers' deposit rates are 2½ p.ct. The deposit rates at the discount houses are 2½ p.ct. at call and 2⅝ p.ct. at notice.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr	Dividends. Last Hf. Yr.	NAME.	Quotations. July 1.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices.
£			% p.a.	% p.a.				
171,978	Stk.	Feb. 10	4	5	Aldershot 5 p.c. max. C.	70—73	..	..
223,992	"		4	4	Do. 4 p.c. Pref.	68—71	..	..
1,561,868	"	Apl. 7	6½	7	Alliance & Dublin Ord.	64—67	+1	69
574,000	"	Jan. 13	4	4	Do. 4 p.c. Deb.	65—68	..	..
522,654	"	—	—	—	Barnet Ord. 7 p.c.	101—104	..	..
300,000	1	Apl. 28	1/7½	1/7½	Bombay, Ltd.	1—1⅛	..	..
170,000	10	Mar. 10	8½	8½	Bournemouth 5 p.c.	12⅜—13½	..	21/6—22/3
500,050	10	"	7	7	Do. B 7 p.c.	12½—12⅝	..	..
275,000	10	"	6	6	Do. Pref. 6 p.c.	11—11½	..	19⅜
50,000	Stk.	June 29	3	3	Do. 3 p.c. Deb.	54—57*	..	11⅛—11⅜
162,025	"	"	4	4	Do. 4 p.c. Deb.	74—77*	+1	..
357,900	"	"	—	—	Brighton & Hove 6 p.c. Con.	105—108	−1	..
341,800	"	—	—	—	Do. 5 p.c. Con.	92—95	..	..
1,387,500	"	Feb. 24	5	5	Bristol 5 p.c. max.	86—87a	..	..
865,000	"	Mar. 24	8	8	British Ord.	106—109	−2	..
100,000	"	June 29	7	7	Do. 7 p.c. Pref.	112—117*	..	108½—108⅝
120,000	"	"	4	4	Do. 4 p.c. Red. Deb.	73—78*	..	..
300,000	"	"	—	33/2	Do. 5 p.c. Red. Deb.	94—96*	−2	76½
100,000	10	May 26	6	8	Cape Town, Ltd.	7¼—8¼	−2	..
180,000	10	Apl. 28	4½	4½	Do. 4½ p.c. Pref.	6—7	..	..
436,860	Stk.	June 29	4½	4½	Do. 4½ p.c. Deb.	70—75*	..	6⅝
287,880	"	Feb. 24	6	6	Cardiff Con. Ord.	99—102	..	..
197,150	"	June 29	7½	7½	Do. 7½ p.c. Red. Deb.	99—102*	..	..
79,185	"	Feb. 24	5	6½	Chester 5 p.c. Ord.	86½—91½	−1	..
24,495	1	Apl. 28	12/-	12/-	Colombo Ltd. Ord.	29/—31/-	..	..
321,490	1	" 7	1/4⅜	1/4⅜	Do. 7 p.c. Pref.	20/—22/-	+8/-	22/4½—29/10½
173,900	1	"	1/9½	1/9½	Colonial Gas Assn. Ld. Ord.	24/6—26/6	..	..
1,312,980	Stk.	Feb. 24	1/7½	1/7½	Do. 8 p.c. Pref.	20/—22/-	..	..
560,000	"	"	5½	5½	Commercial 4 p.c. Cap.	87—90	..	..
475,000	"	June 16	5/3¾	5/3¾	Do. 3½ p.c. Cap.	85—88	..	88
309,000	"	Sept. 30	3	3	Do 3 p.c. Deb.	56—59	..	..
300,000	"	Mar. 10	12	11	Continental Union, Ltd.	35—38	..	58—58⅛
787,850	"	Mar. 10	7	7	Do. 7 p.c. Pref.	80—83	..	..
408,100	"	"	6½	6½	Croydon sliding scale	96—99	+1	..
492,270	"	Feb. 24	6	6	Do. max. div.	77—80	..	98—98½
55,050	"	Dec. 30	4	9	Derby Con.	104—106a	..	79—79½
209,000	"	Mar. 10	5	4	Do. Deb.	73—75a	..	..
50,000	"	June 16	5	5	East Hull Ord. 5 p.c.	76—80	..	..
1,002,180	10	Mar. 24	12	5	Eastbourne 5 p.c. Deb.	90—95	..	..
14,747,480	Stk.	Feb. 10	5/1/4	12	European, Ltd.	6½—7½	..	..
2,600,000	"	"	8½	5	Gas Light & Coke 4 p.c. Ord.	87—89	..	6⅝—6⅞
4,187,080	"	"	4	8½	Do. 3½ p.c. max.	60—62	..	87¼—88⅛
5,602,630	"	June 16	3	4	Do. 4 p.c. Con. Pref.	76—78	+1	60—61¼
121,315	"	"	6	3	Do. 3 p.c. Con. Deb.	57⅛—59½	..	76¼—77⅛
1,042,770	"	"	5	6	Do. 6 p.c. Br'st'd Rd. Db.	100—103	..	58¼—58¾
48,000	"	—	7½	5	Do. 5 p.c. Red. Deb.	98—100	..	101½
93,500	"	Mar. 10	6½	7½	Do. 7½ p.c. Ilford Deb.	..	..	..
268,740	"	"	5½	6½	Hastings & St L. 5 p.c. Conv	90—92	..	..
70,000	10	Apl. 28	†10	5½	Do. 3½ p.c. Conv.	67—72	..	..
178,800	Stk.	Mar. 10	5	†10	Hongkong & China, Ltd.	12—18	..	..
1,976,000	"	May 12	10	5	Hornsey Con. 3½ p.c.	67—69	..	..
223,180	"	Feb. 10	3½	10	Imperial Continental Cap.	137—141	..	139—139½
235,242	"	Mar. 10	6½	3½	Do. 3½ p.c. Red. Deb.	69—71	..	..
2,145,907	"	Feb. 24	5½	6½	Lea Bridge 5 p.c. Ord.	94—97	..	..
600,000	"	Sept. 30	7	5½	Liverpool 5 p.c. Ord.	85—86b	..	..
165,786	"	Feb. 24	8	7	Do. 7 p.c. Red. Pref.	103—105b	..	103
69,480	"	June 16	8	8	Maidstone 5 p.c. Cap.	110—115	..	..
75,000	5	June 16	17	18	Do. 3 p.c. Deb.	50—55	..	..
541,920	Stk.	May 26	†5	†7	Malta & Mediterranean	5—5¼	..	..
2,061,515	"	Feb. 24	5	5	Montevideo, Ltd.	89—93	..	..
360,929	"	"	4	4	Newcastle & Gateshead Con.	74—74½d	..	90½—91
691,705	"	June 23	8½	8½	Do. 4 p.c. Pref.	68—69d	..	..
181,785	"	—	—	—	Do. 3½ p.c. Deb.	66½—67½d	−1½	..
800,000	"	Apl. 28	9	7	North Middlesex 6 p.c. Con.	91—93	..	..
188,120	"	June 23	7½	7½	Oriental, Ltd.	99—102	..	..
414,500	"	Feb. 24	7½	7½	Plym'th & Ston'house 5 p.c.	102—107*	−8	100—101½
286,732	"	"	5	5	Portsm'th Con. Stk. 4p.c. Std.	102—105	..	..
2,389,909	1	—	—	—	Do. 5 p.c. max.	76—79	..	..
282,200	100	June 1	4	4	Primitiva Ord.	15/3—16/3	+/6	15/1½—15/10½
600,000	Stk.	Jan. 27	4	4	Do. 4 p.c. Red. Deb.	84—86	..	..
484,968	"	June 29	4	4	Do. 4 p.c. Red. Deb. 1911	70—72	..	..
150,000	10	Mar. 24	—	4	Do. 4 p.c. Cons. Deb.	69—71*	..	70
125,000	50	June 29	6	6	San Paulo 6 p.c. Pref.	7½—7⅞	−1	..
270,000	Stk.	Mar. 24	5	5	Do. 5 p.c. Red. Deb.	46—49*	..	..
419,968	"	"	5½	5½	Sheffield A	97—99e	−1	..
1,047,000	"	"	5½	5½	Do. B	97—99e	−1	..
90,000	10	May 26	4	6	Do. C	97—99e	−1	..
6,809,895	Stk.	Feb. 24	7	7	South African	97—99e	−1	..
1,895,445	"	Jan. 13	3	3	South Met. Ord.	4—6	..	..
784,000	"	Mar. 10	6½	6½	Do. 3 p.c. Deb.	100½—102½	..	..
91,500	"	Feb. 24	8½	8½	Do. 5 p.c. Deb.	57—60	+½	101—102
1,243,795	"	Mar. 10	6½	6½	Do. 5½ p.c. Red. Db.	100—102	..	..
868,837	"	June 16	5	5	South Shields Con.	104—106d	+1	..
647,740	"	Mar. 24	5	5	South Suburban Ord. 5 p.c.	103—106	..	..
121,975	"	June 29	4	4	Do. 5 p.c. Deb.	92—95	..	..
250,000	"	Feb. 24	7	7	South'mpton Ord. 5 p.c. max.	74—77	..	..
200,000	"	June 16	6½	6½	Do. 4 p.c. Deb.	71—74*	..	75½—76½
180,000	"	Feb. 24	7½	6½	Swansea 7 p.c. Red. Pref.	100—102	−1	..
289,275	"	"	6½	7½	Do. 6½ p.c. Red. Deb.	100—102	..	..
150,000	"	"	6½	6½	Tottenham District A 5 p.c.	107—110	..	..
181,255	"	June 16	6½	6½	Do. B 3½ p.c.	91—94	..	..
258,261	"	Mar. 10	4	4	Do. 5½ p.c. Pref.	97—100	..	91½—94
			5	5	Do. 4 p.c. Deb.	70—78	..	..
283,094	"	Mar. 10	6½	6½	Tynemouth Con. and New	71—72d	..	..
88,890	"	"	5	5	Uxbridge, Maidenhead, & Wycombe 5 p.c.	85—90	..	..
					Do. 5 p.c. pref.	83—88	..	..
30,000	"	Mar. 10	8½	8½	Wandsworth, Wimbledon, and Epsom—		..	..
265,686	"	"	7	7	Wandsworth A 5 p.c.	120—125	..	..
482,585	"	"	5/19/0	5/19/0	Do. B 3½ p.c.	102—107	..	..
569,000	"	"	6½	6½	Do. C and New	90—95	..	..
98,000	"	"	7½	7½	Wimbledon 5 p.c.	98—103	..	..
88,416	"	June 29	3	3	Epsom 5 p.c.	108—109	..	102½—102½
					3 p.c. Deb.	52—55*	−2	..

Quotations at:—d.—Bristol. b.—Liverpool. e.—Nottingham. d.—Newcastle e.—Sheffield. * Ex. div.
† Paid free of income-tax. ‡ For year.

"HOLMES' Super Type Installations for 1927"



A recent **HOLMES'** Installation at the new Pitwines Works of the Bournemouth Gas and Water Company.

The above Plant, working in conjunction with an installation of **HOLMES' "SUPER" TYPE CONDENSERS,** recovers the whole of the tar and ammonia contained in the gas without washing with water.

The ROTARY WASHER (1920 PATENT BRUSH WASHER) is used for concentration of weak liquor, the ammonia remaining in the gas being absorbed by sulphuric acid in a final **HOLMES' CONTACT CHAMBER.**

A HOLMES' PATENT "DRI-GAS" PLANT will also shortly be in operation, enabling all gas produced on the works to be freed from moisture and naphthalene before distribution.

W. C. HOLMES & Co., Ltd.

GAS - AND - BYE-PRODUCTS - ENGINEERS

TELEPHONES: HUDDERSFIELD 1573 PVTE. BRANCH EX.

Whitestone Ironworks,
HUDDERSFIELD

TELEGRAMS "HOLMES HUDDERSFIELD"

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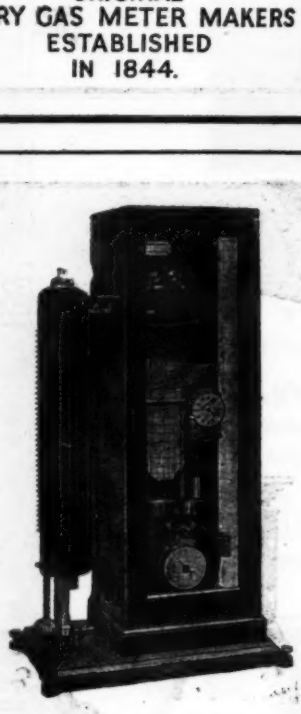

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